ESTABLISHED 1847

# Carton Boilers

FOR STEAM AND
HOT WATER

THE CARTON FURNACE CO.
UTICA, N.Y.

Catalogue and Price List.

Established in 1847.

Makers of Heaters for the past 50 Years.

# CARTON

## STEAM AND HOT WATER

# HEATERS

Manufactured by

## The Carton Furnace Company,

## Utica, N. Y.


Officers:

EDWARD A. CARTON,
President and General Manager.

WILLIAM J. CARTON,
Vice-President and Treasurer.

JOHN B. JONES, Secretary.

Office and Salesroom,
187 and 189 Genesee Street.

Foundry,
12 to 46 Carton Avenue.


PRESS OF SPRINGFIELD PRINTING AND BINDING COMPANY, SPRINGFIELD, MASS.

# Introduction.

Our experience in the manufacture of heating apparatus, embracing a period of fifty years (half a century), we think entitles us to the confidence of the heating trade. In presenting our annual catalogue and price list of the Carton steam and hot water heaters, we beg to call attention to the fact that during the past few years improvements in heating boilers have been somewhat slow because of the unwillingness of manufacturers to throw away old and obsolete types, owing to the great expense of bringing out new patterns. In the production of the Carton steam and hot water heaters, we have aimed, regardless of expense, to produce boilers embodying the essential and vital requisites, to wit: efficiency of the heating surface, the largest practicable fire surface within the combustion chamber, proper ratio of grate surface to boiler surface, perfect combustion, proper temperature of gases in flues, vertical water and steam circulation, ease of access for cleaning boiler surface, ease of management, and superiority in the mechanical construction.

We claim to excel, and challenge comparison, and we submit as proof of our claim of "efficiency of boiler surface" the trial duty test made by Mr. William J. Baldwin, M. E., of New York, as reproduced on pages 17, 18, and 19 of this catalogue. We manufacture our heaters and our personal supervision and careful attention is given to every detail in their construction. We market our heaters through and to the trade only; we are manufacturers and not contractors. We protect our sales agents, believing our interests are mutual. We do not make plans or working drawings for installing a heating plant, neither do we furnish salesmen to solicit or make sales for the trade or contractors, our policy being to obliterate this expense from our business, giving the trade the benefit of this saving in a corresponding lower price of our heaters. We believe this policy will be more profitable and preferable to the trade and ourselves.

Respectfully,

**The Carton Furnace Company.**

# To the Trade.

All heaters are sold F. O. B. (free on board cars) Utica, N. Y. We allow no freight. All heaters are shipped at owner's risk on what are termed "released freight rates" (unless specially specified in the order to the contrary), in order to secure the lowest rates of freight, and when we make delivery in good order to the transportation company and receive their receipt, the goods become the property of the consignee, and any claims for damages or loss incident to their delivery must be made on them. All claims for correction, of any nature, must be made within ten (10) days from receipt of goods. In the absence of definite shipping directions, we will send by the regular route. We positively refuse to ship goods on "consignment" or "on sale." We make shipments only on positive sales.

Orders through our traveling representatives must state all conditions and agreements and must bear the purchaser's signature. No verbal agreements are recognized. Goods must not be returned to us without our consent, and when returned on these conditions if in good order will be credited at ten per cent. (10%) less than the purchase price and with expenses deducted. To avoid any unnecessary delay by correspondence, let your order be explicit, particularly so in mentioning the series, to wit: "A," "B," "C," or "D." State if steam boiler or hot water boiler. Address all correspondence to home office, Utica, N. Y.

## Terms of Payment.

Terms of sale, 60 days from date of shipment. A discount of 2% will be made for prompt cash settlement within ten days from date of shipment. Interest will be charged upon invoices not paid when due. Repairs strictly net cash.

# Guarantee.

We guarantee the workmanship and material in their construction; also the listed ratings of our heaters under the following

## Conditions.

All the connecting pipes to be properly covered or if not covered their superficial area to be added to the radiating surface.

The piping to be of adequate size and of proper pitch to insure free circulation and to be without traps or other hindrances.

The boiler to be connected with the size smoke pipe we specify to chimney flue of sufficient size and good draft; boiler to be set to the chimney and not removed at a distance from the same.

The coal to be of the best quality and, if anthracite coal is used, the size of the same to be what is known as "stove" size.

That the boiler is properly set up, connected and covered as per our directions on pages 62 and 63.

That the fire has proper attention and the heater is properly managed.

## Notice.

When soft coal is used for fuel it is recommended that a size larger boiler be figured than when hard coal is to be used.

Each steam boiler is supplied with steam gauge, water column and glass complete, safety valve, damper regulator complete, and blow-off cock,—all of the best and latest design, and of superior finish and workmanship.

A complete set of fire tools is shipped with each boiler.

We will not allow any counter charges for labor, material, freights, etc., for changes in the installation of any plant or change of size of heater.

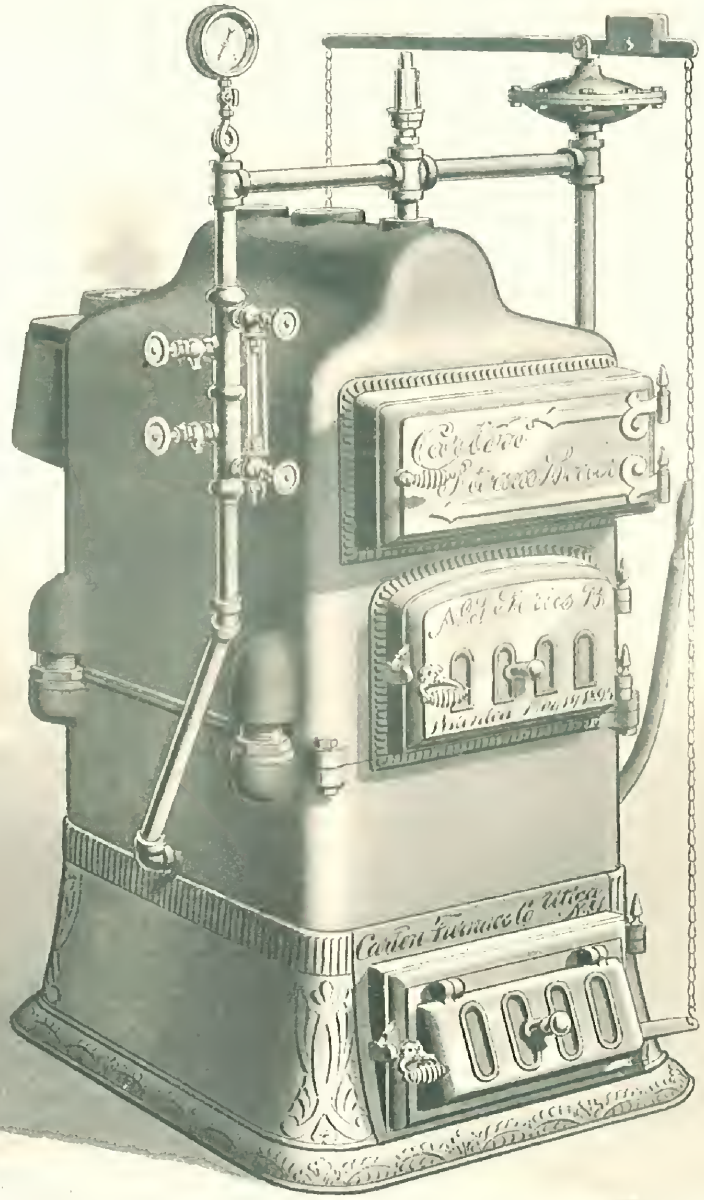
# Steam Heaters.

# Carton "B" Series

## Steam Heater.

### Dimensions, Capacities, Tappings, Price List.

| Designating Number, | | No. 1 | No. 3 | No. 5 |
|---|---|---|---|---|
| Size of Grate, | Inches | 12×16 | 16×20 | 20×24 |
| Height of Water Line, | Inches | 42½ | 45½ | 50 |
| Height of Heater, | Inches | 48½ | 56 | 61 |
| Width of Heater, | Inches | 26½ | 31 | 35 |
| Length of Heater, including Flue Box, | Inches | 37 | 43 | 47½ |
| Diameter of Smoke Pipe, | Inches | 7 | 8 | 9 |
| Supply Tapping, | | 1 3" | 2 2½" | 2 2½" |
| Return Tapping, | | 1 3" | 2 2½" | 2 2½" |
| Direct Radiation, with Connecting Pipes covered, | Square Feet | 150 | 250 | 450 |
| Shipping Weight, | Pounds | 1030 | 1440 | 1970 |
| Price List, with Trimmings, F. O. B. Utica, N. Y., | | $212 | $300 | $425 |




"B" Series

**Carton Steam Boiler.**

Exterior View.

# Carton "B" Series

## Steam Boilers.

### General Description.

This series, as will be seen by the illustration, is constructed practically in three pieces, ash pit, fire pot, and dome section. We provide a cast-iron base plate into which the ash pit is set. The ash pit is roomy and of sufficient height to protect the grate. The fire pot section is corrugated on its four sides, insuring good combustion of the fuel on the outer edges of the fire. This section is hollow and the return connection is provided for in the back.

### The Lock-Nut Nipple Connections

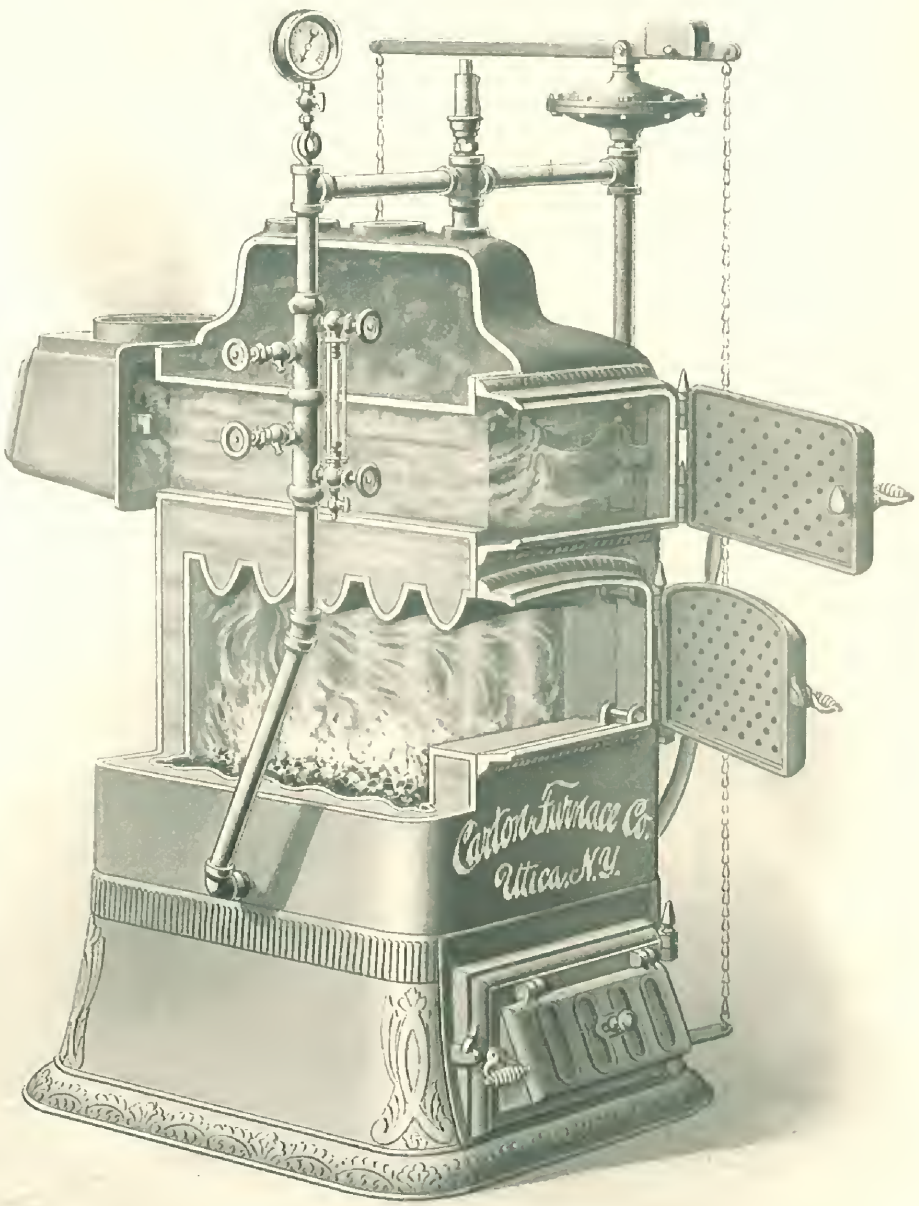
Connecting the fire pot section to the dome section are a distinctive feature of this heater. These connections are made at each corner of the heater and are not in any way exposed to the fire, being all on the outside of the heater. There are no internal connections. These connections are tight and they remain so.

### The Dome Section

Contains two distinctive features, to wit: the flue construction and the formation of the crown sheet. The flues are so arranged that we do not divide the combustion or cause any conflict of the currents in passing to the smoke box (see illustration) in the rear of heater. The combustion is concentrated in being drawn to the center vertical flue from the rear of the crown sheet, thence forward (see illustration) to the front of the heater, returning to the smoke box (see illustration) in the rear of the boiler by the two side flues. We have aimed to retain as large an amount of boiler surface in this heater as possible, by forming the front flue with a flue box extending in front of the heater, and next by the formation of our

### Crown Sheet.

It will be seen by illustration that this crown sheet is made up of a series of V-shaped curved corrugations, extending across the boiler in direct opposition to the fire travel. They extend three inches down into the combustion chamber. We think the advantage of such a large amount of direct fire boiler surface can be appreciated without emphasis on our part, and it cannot but be conceded that this crown sheet represents an exceptional amount of fire surface subjected to the direct radiant rays of heat from the surface of the fire. The feeder door and flues doors are made large.




"B" Series

**Carlon Steam Boiler.**

Cut Away View.

## Erection.

In erecting this boiler in the cellar it is simply necessary after placing the base plate on a perfectly level foundation, to place ash pit on the same, and place over the same fire pot and dome sections, which are shipped connected. After the doors and smoke box have been properly cemented and attached, the heater is ready to be connected to the piping.

This heater is of such dimensions as to be easily carried into any ordinary cellar and is so simple that its erection can be easily and quickly accomplished.

## The Grates

As shown in illustration are the same as used in our other boilers, which are so easily operated, insuring a bright grate surface and perfect combustion. They are strong and durable but in case of accident they can be easily replaced. These grates are adapted to hard or soft coal.

## Shipping.

In shipping these heaters the dome and fire pot sections are shipped connected as one piece of casting; the ash pit and base separate, and other parts are boxed.

## General Points.

Vertical circulation, large area of fire surface, liberal flue capacity, tight connections, large feed and flue doors, easily cleaned, good combustion chamber, economical in fuel, and easily managed.

"B" Series

## Carton Steam Boiler.

View of Grate.

# Carton "A," "C," and "D" Series

## Sectional Steam Heaters.

### A Proven Claim.

In the construction of these heaters we have spared no expense and our efforts have resulted in producing steam heaters with more positive and effective boiler surface than can be found in any form of cast iron sectional boiler on the market. These boilers have shown on a test an evaporation of "11.02 lbs. of water per lb. of combustible." See copy of test on page 18. It will also be noticed in this test, page 19, that the temperature of the gases of combustion entering the chimney ranges from 3 degrees to 21 degrees above the temperature of the steam, which fact alone proves our emphatic claim that these boilers utilize about all the available heat of the fuel consumed. We are not making exaggerated or irrational claims that cannot be proved.

### The Ash Pits

Of these boilers are surrounded by water as the water-legs of the fire box extend down to the floor line and by this construction all the heat given off at the bottom of the grates and from the heated ashes is absorbed. The condensation does not return into the boiler above the grate line but is connected into the water-legs at the bottom of ash pit where the water is cooler than above the grate line. Ample room is provided under the grates but, if desired, any depth of ash pit may be had by constructing brick ash pit below bottom of water-legs. The sections stand on bed plates we provide, which insures a good level foundation for the heater to stand on, bringing the nipples true to the drum tappings and requiring but a short time to set up the heater.

## The Fire Boxes

Are large and roomy. The "A" and "C" Series have large single feed doors and the "D" Series has two large feed doors. These feed doors are made perfectly tight by heavy turn keys at top and bottom, and we also provide expansion flanges around the entire opening of the feed door which the feed door fits over making a perfect fit. The doors are lined with heavy perforated hollow plates on the inside and filled with magnesia. The sides and back of fire boxes are double corrugated, adding to the direct fire surface, giving greater strength to the castings, and insuring perfect combustion on all sides of the fire box. The front of the fire box between the bottom of feed door and grate is provided with hollow, sectional,

cast-iron plates (see illustration) made heavy and strongly stayed, with openings at the top and bottom which provide for a continual flow of air through these hollow plates between them and the boiler front. This current of air not only preserves the plates but acts as a hot blast and aids the combustion of the gases, preventing any dead fire in extreme front of fire box.

## The Crown Sheet

Is constructed with a series of drop V-shaped corrugations arched at the center so they drain at either side. These V-shaped corrugations are 6 inches in depth and 6 inches apart in the "A" Series, and 8 inches in depth and 8 inches apart in the "C" and "D" Series.

They not only add strength to the water-legs but largely to the direct fire surface, and we claim this to be the most effective crown sheet on any boiler yet in the market. The water in these V-shaped corrugations absorbs the heat very rapidly, causing an immediate circulation in the vertical waterways forming the top of these corrugations. It is surprising how quickly steam will generate in these heaters; when the draft is put on the effect seems instantaneous. There is no overshadowed surface on this crown sheet.

## The Combustion Travel.

The intermediate and bridge wall sections are cut away in the lower set of flues so that the combustion is partially drawn up through between the sections into the lower set of flues, which removes all dead surface making this lower set of flues, all fire surface being subjected to the direct radiant rays of heat from the combustion chamber.

This insures a high temperature of the gases in this lower set of flues and increases the temperature of the gases in the top series of flues, which are also slightly cut away between the flues, removing any dead boiler surface where the flues come together. The arched waterways forming the bottom of this top set of flues come together section to section, thereby separating the bottom set of flues from the top set of flues. The combustion is also carried to the flue in the back of the combustion chamber, thence to the front of boiler and returning again to back of boiler in the six top flues concentrated in the smoke box (see illustration) on the back of the boiler. We maintain a long fire travel in the boiler three times the length of the heater, but at the same time we do not condense the flue gases to a degree where they are a detriment in the heater; a point of merit which is a special feature in these heaters. The flue spaces are of such capacity that perfect combustion is easily obtained with a moderate fire.

## The Upper Tier of Waterways.

By the series of arches in these upper waterways, the water line being below the same, the water is prevented from lifting into the steam drum; as it will be seen by the following illustrations, the vertical waterways are perfectly relieved, insuring dry steam from the steam drum. This peculiar construction is a feature of these boilers that can be readily appreciated by the practical heating engineer or fitter. We also provide a drip pipe connection to connect the top steam drum to the return drum to relieve the condensation of the steam in the top drum. This connection on the top drum is on the side, and connection is made to the top of one of the side bottom drums. This pipe connection should be 2 inches on all sizes, and it is particular that this connection should be made in setting up the heater to insure good results.

### The Cleaning of the Flues

Has been carefully provided for. The "A" Series is provided with one and the "C" and "D" Series with two extra large flue doors; by means of these doors the entire front and flues of the heater are exposed and the heater can be perfectly cleaned under any conditions of the fire in a few moments' time. This point is worthy of careful consideration.

### Vertical Circulation.

By the following illustration it will be readily seen that the circulation in these boilers is all vertical and positive. The circulation through the vertical waterways from the crown sheet is very rapid, and the boiler surface being so largely exposed to the direct radiant rays of heat from the fire, the heat is conducted or transmitted to the water very quickly, there being only a small percentage of the boiler surface that is overshadowed; hence the rapidity of the circulation through the vertical waterways can be appreciated.

We are not making an exaggerated claim in the statement that the effect of heat on this boiler surface as we have it arranged is instantaneous.

### Lock-Nut Nipple Connections.

Each section is a separate and independent boiler. There are no internal connections; no gaskets or packed joint connections; all connections are on the outside of the heater away from the heat. The flow and return headers are connected to the heater by 2-inch lock-nut nipples in the "A" Series, and 2½-inch in the "C" and "D" Series, upon one end of which is cut a standard taper thread and upon the other end is cut a straight or running thread which is made tight with the lock nut packed with asbestos wicking and red lead.

### The Sections

As will be noticed by illustration are very strong; the curved arched waterways give great strength to the castings. The water back section is heavily corrugated on its flat surface and is also well stayed in the waterway of this flat surface. We have never known one of these intermediate or water back sections to crack. The depth of these sections in the "A" Series is 6 inches and in the "C" and "D" Series 8 inches.

## The Grates

Are illustrated in the "set-up" views following. They are built very strong and are adapted to burning soft or hard coal or wood. They operate very easily and perfectly clean the grate surface of ashes and clinkers without disturbing or packing the fuel too tightly together to prevent good combustion. There is no necessity of dumping the grate, but, if for any reason this is desired, the lever handle can be drawn forward far enough to allow the grates to stand vertical and in this way dump into the ash pit the entire contents of the fire box without disturbing the grate. In the "A" Series the grates are operated with one lever handle and in the "C" and "D" Series with two; the front grates are operated with one and the back grate with the other. The grates are easily replaced in case of an accident, being drawn out from the front of the heater by simply removing the lower piece of the front, not necessitating working to a disadvantage through the feed door. On account of the large size of the grate bars in the "C" and "D" Series we have provided for drawing them out in pairs and three so that even with these extremely large grates it is a simple matter to replace them. The proper ratio of grate to boiler surface has been carefully considered and our conclusions are the result of a thorough study of this important feature and repeated experiments to prove the correctness of our theory. In the "set-up" views in the following pages, will be seen the provision we have made by the bridge wall section, and our directions on mounting these heaters will explain where this bridge wall section is placed in the different size heaters.

## Heights of Heaters.

We have carefully considered this point in the construction of these heaters and have made them as low as is consistent with the more vital requisites, to wit: proper depth of ash pit, fire pot and combustion chamber, flue and steam space; believing from experience that in the construction of boilers the gases should continually rise from the combustion chamber, thereby maintaining a higher temperature, instead of being condensed and their temperature lowered by being reverted into lower flues near the base of heater. Comparatively cool gases in boiler flues is an exploded theory; a practical experiment will prove the fallacy of such claim.

## Boiler Covering.

We furnish with each of these heaters a sufficient amount of the best non-conducting substance to properly cover the heater and drums 1½ inch thick.

## These Heaters

Are self contained, free from all joints, no brick work, large combustion chamber, large direct fire surface, large flues, vertical circulation, ample ash pits, easily cleaned, perfect in workmanship and operation.

# What William J. Baldwin, M. E., says.

277 Pearl Street, New York, October 15, 1894.

The Carton Furnace Company,
Nos. 187 and 189 Genesee Street,
Utica, N. Y.

Gentlemen:—

Agreeable to your request I have made the usual duty trial on your No. 4 Steam Boiler, and respectfully report as follows:—

The trials were made at a steam pressure of five (5) pounds, and cold water was fed into the boiler at a temperature of 52° Fah.

The temperature of the flue gases as they passed through a short smoke pipe ranged from 230° Fah. to 248° Fah. during the trials.

The evaporation of water from 52° Fah. to 5 pounds pressure of steam was 9.32 pounds of water per pound of dry coal.

## Note Low Temperature of Flue Gases (230°) in Smoke Pipe.

## 11.02 Pounds of Water Evaporated per Pound of Combustible.

The evaporation per pound of combustible—the ashes and clinkers having been weighed back—was 10.07 pounds of water from 52° Fah. to 5 pounds pressure of steam.

The equivalent evaporation per pound of coal from water at 212° Fah. to 5 pounds pressure of steam is 10.2 pounds of water. The equivalent evaporation, therefore, from the temperature of the return water, in a gravity apparatus to low pressure steam, is approximately 10 pounds of water per pound of coal.

The equivalent evaporation per pound of combustible from water at 212° Fah. to 5 pounds pressure of steam is 11.02 pounds of water.

The amount of coal burned per square foot of grate per hour was 5.14 pounds.

The amount of combustible burned per square foot of grate per hour was 4.76 pounds.

The amount of water evaporated from 52° Fah. to 5 pounds steam pressure, per square foot of average boiler surface, per hour, was 2.17 pounds.

The equivalent evaporation of water from 212° Fah. to 5 pounds steam pressure, per square foot of average boiler surface, per hour, is 2.368 pounds of water.

## Notice We Rate Our Boilers Lower Than Mr. Baldwin's Test.

**Read the last two paragraphs of this letter.**

Calorimeter tests of the quality of the steam were made from time to time, which showed that the steam was practically at maximum density; or, in other words, the steam was dry.

The rating of the No. 4 boiler above described and tested is 640 square feet of radiation, for house heating by steam when the pressure is low (say 1 to 5 pounds).

The above calculation of heating surface is based on the use of 5 pounds of coal per square foot of grate, and forms the maximum condition for a house heating boiler.

You will note that when the rate of combustion is equal to 5 pounds of good anthracite coal per square foot of grate per hour, one square foot of average boiler surface evaporated sufficient steam for 10 square feet average radiation,—an exceedingly high efficiency and rarely obtained in practice.

The low temperature at which the gases of combustion entered the chimney, ranging from 3 to 21 degrees above the temperature of the steam, shows that the boiler utilizes about all the available heat of the fuel.

Respectfully submitted,

WILLIAM J. BALDWIN.

The best designed boilers, well set, with good draft and skillful firing, will evaporate from 7 to 10 pounds of water per pound of first-class coal. The average result is from 25 to 60 per cent. below this.

# Carton "A" Series

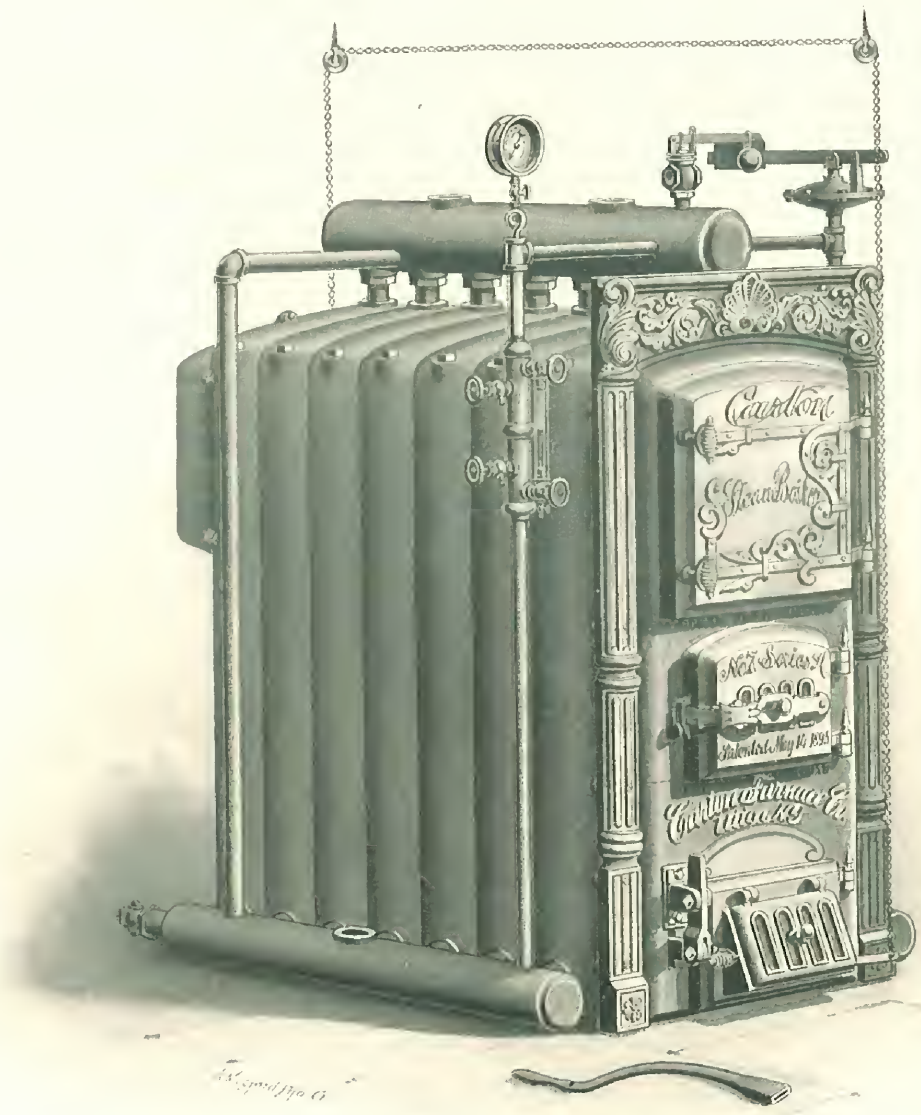
## Steam Heater.

### Dimensions, Capacities, Price List.

| Designating Number | No. 4 | No. 5 | No. 6 | No. 7 | No. 8 |
|---|---|---|---|---|---|
| Number of Sections | 4 | 5 | 6 | 7 | 8 |
| Depth of Sections, ....Inches | 6 | 6 | 6 | 6 | 6 |
| Size of Grates, ....Inches | 20×21 | 20×27 | 20×33 | 20×39 | 20×45 |
| Height of Water Line ....Inches | 48 | 48 | 48 | 48 | 48 |
| Height of Heater, including Drum, ..Inches | 70 | 70 | 70 | 70 | 70 |
| Width of Heater, including Drums, ..Inches | 42 | 42 | 42 | 42 | 42 |
| Length of Heater, including Flue Box, ..Inches | 31 | 37 | 43 | 49 | 55 |
| Diameter of Smoke Pipe, ....Inches | 8 | 9 | 10 | 10 | 12 |
| Direct Radiation, with Connecting Pipes Covered, ....Square Feet | 400 | 500 | 600 | 700 | 800 |
| Shipping Weight, ....Pounds | 2230 | 2590 | 2950 | 3310 | 3670 |
| Price List, with Trimmings, F. O. B. Utica, N. Y., | $440 | $512 | $583 | $655 | $727 |

### Regular Tappings from Supply and Return Drums.

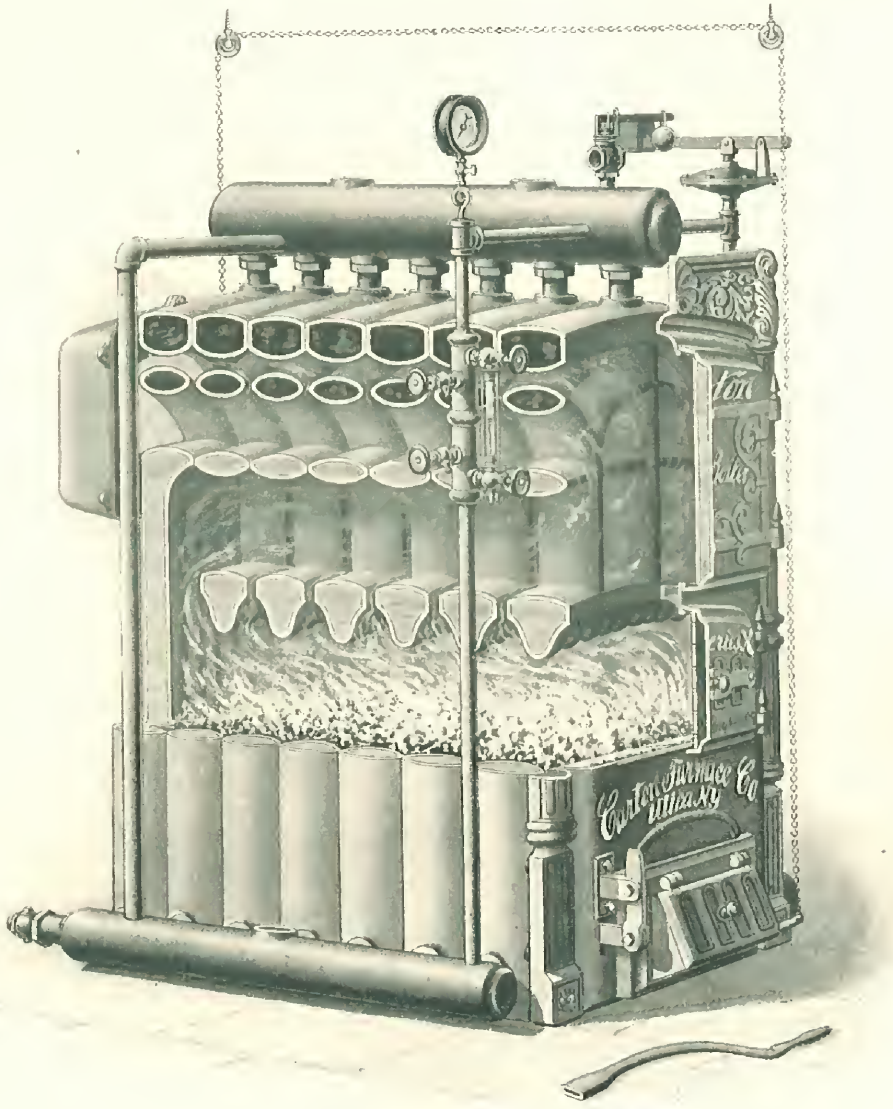
| | SUPPLY DRUM. | | RETURN DRUMS. | |
|---|---|---|---|---|
| Designating Number of Heater. | Tappings on Top of Drum. | Tapping on Back End of Drum. | Total Top Tappings of Both Drums. | Total Back End Tappings on Both Drums. |
| No. 4 | 2 3″ | 1 4″ | No top tapping. | 2 3″ |
| No. 5 | 2 3″ | 1 4″ | 2 3″ | 2 3″ |
| No. 6 | 2 3″ | 1 4″ | 2 3″ | 2 3″ |
| No. 7 | 3 3″ | 1 4″ | 2 3″ | 2 3″ |
| No. 8 | 3 3″ | 1 4″ | 2 3″ | 2 3″ |




"A" Series

**Carlton Steam Boiler.**

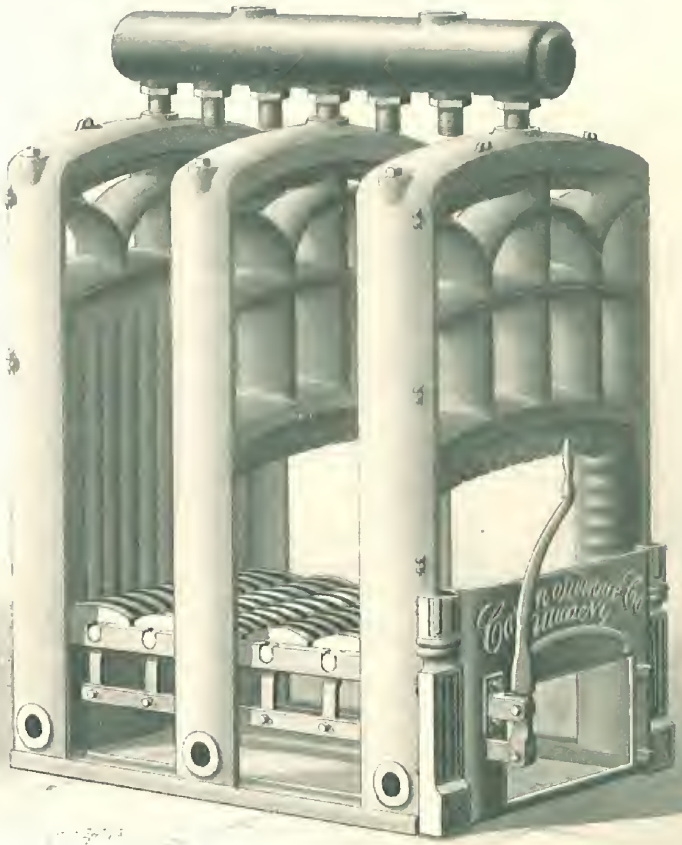
Exterior View.




"A" Series

**Carton Steam Boiler.**

Cut Away View.



"A" Series

**Carton Steam Boiler.**

Set Up View.

# Carton "C" Series

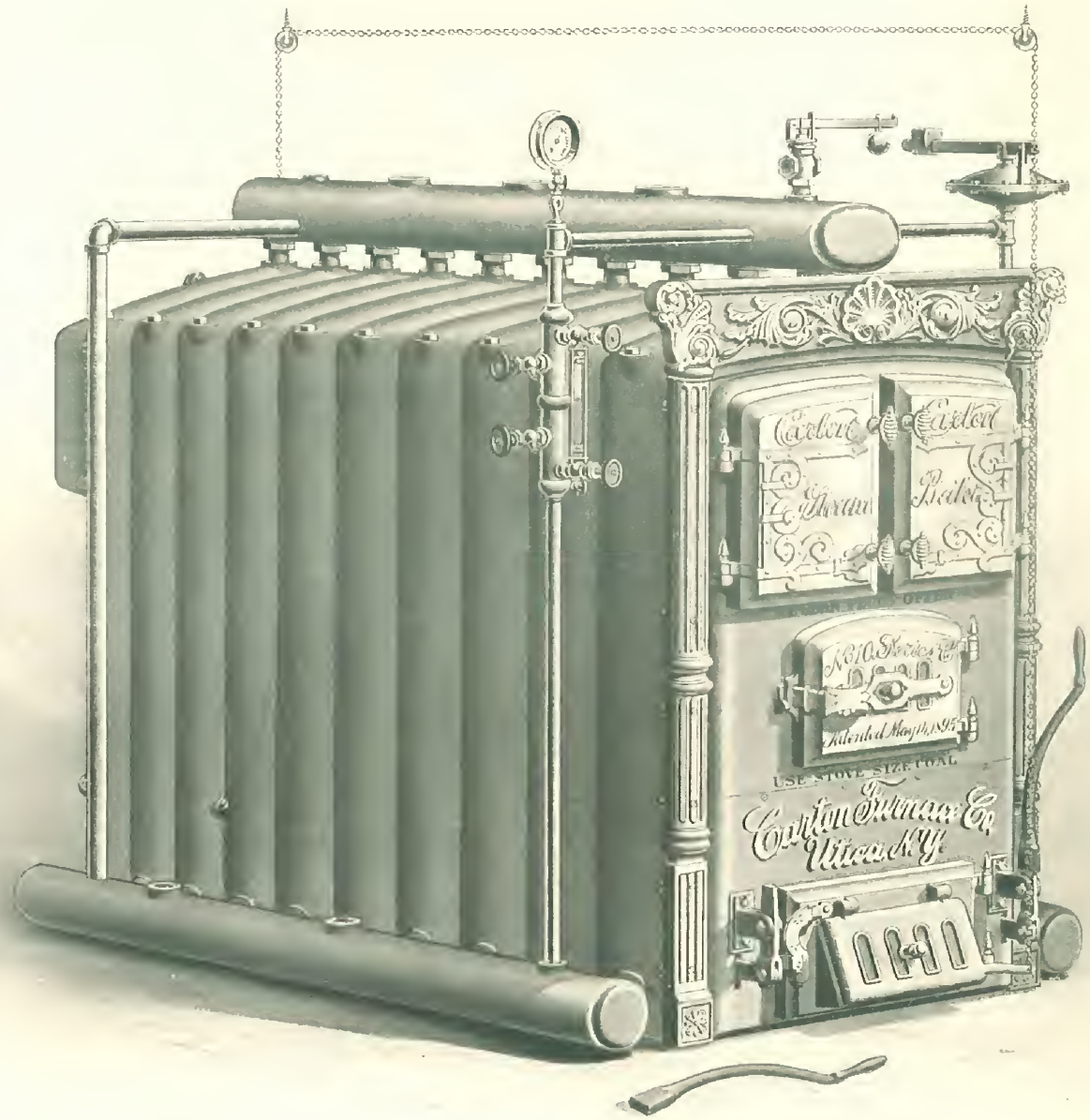
## Steam Heater.

### Dimensions, Capacities, Price List.

| Designating Number, | | No. 5 | No. 6 | No. 7 | No. 8 | No. 9 | No. 10 |
|---|---|---|---|---|---|---|---|
| Number of Sections, | | 5 | 6 | 7 | 8 | 9 | 10 |
| Depth of Sections, | Inches | 8 | 8 | 8 | 8 | 8 | 8 |
| Size of Grate, | Inches | 30 × 36 | 30 × 36 | 30 × 36 | 30 × 41 | 30 × 41 | 30 × 52 |
| Height of Water Line, | Inches | 48 | 48 | 48 | 48 | 48 | 48 |
| Height of Heater, including Drum, | Inches | 73 | 73 | 73 | 73 | 73 | 73 |
| Width of Heater, including Drums, | Inches | 56 | 56 | 56 | 56 | 56 | 56 |
| Length of Heater, including Flue Box, | Inches | 49 | 57 | 65 | 73 | 81 | 89 |
| Diameter of Smoke Pipe, | Inches | 12 | 12 | 12 | 14 | 14 | 14 |
| Direct Radiation, with Connecting Pipes Covered, | Square Feet | 900 | 1100 | 1300 | 1500 | 1750 | 2000 |
| Shipping Weight, | Pounds | 4210 | 5000 | 5600 | 6240 | 6840 | 7470 |
| Price List, with Trimmings, F. O. B. Utica, N. Y., | | $827 | $985 | $1103 | $1229 | $1348 | $1475 |

### Regular Tappings from Supply and Return Drums.

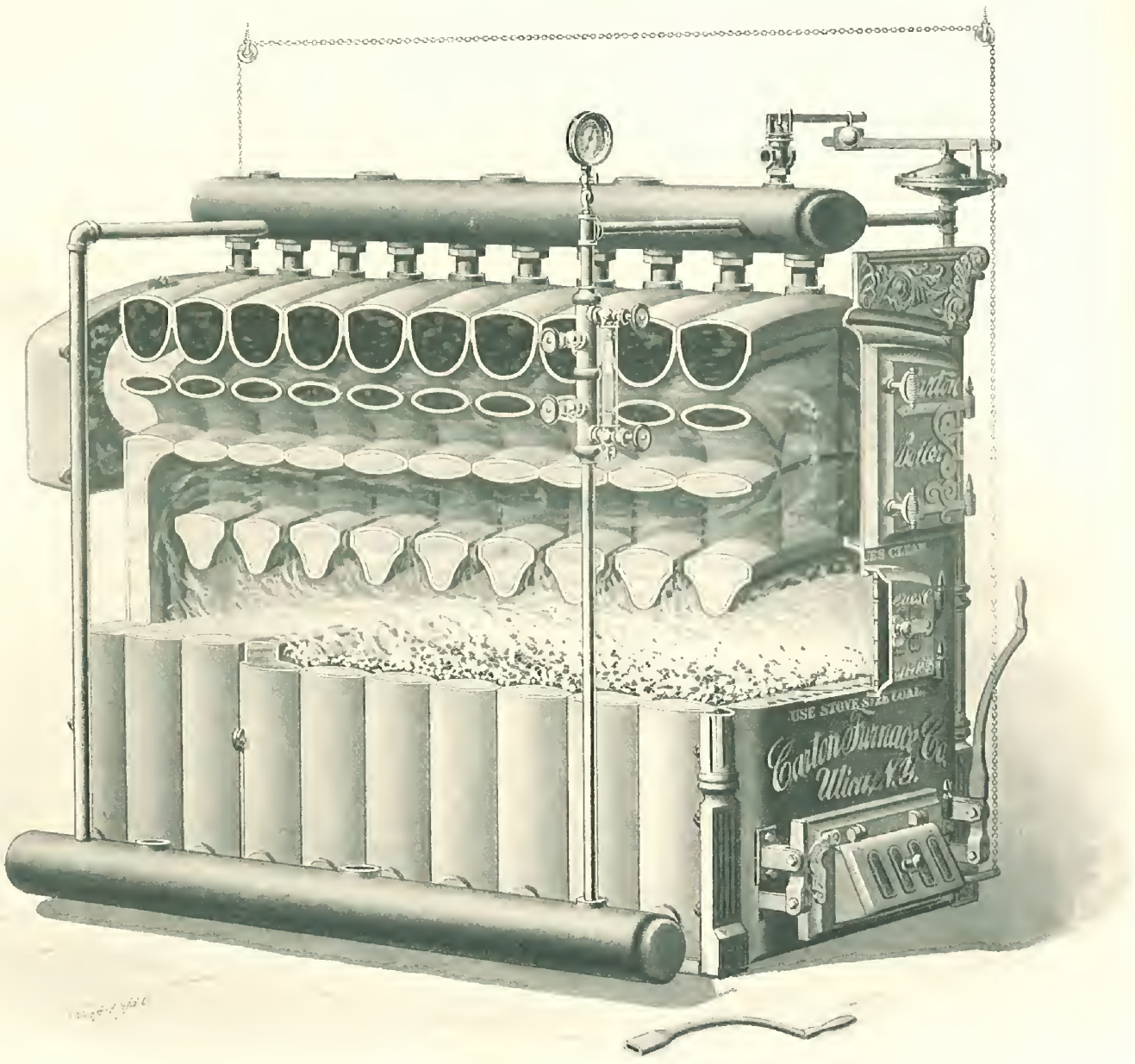
| | SUPPLY DRUM. | | RETURN DRUMS. | |
|---|---|---|---|---|
| Designating Number of Heater. | Tappings on Top of Drum. | Tappings on Back End of Drum. | Total Top Tappings of Both Drums. | Total Back End Tappings on Both Drums. |
| No. 5 | 2 3″ | We can furnish for all sizes special tappings on back end of Drum up to and including 4 inch. | 2 3″ and 2 2″ | 2 4″ |
| No. 6 | 2 3″ | | 2 3″ and 2 2″ | 2 4″ |
| No. 7 | 2 3″ | | 2 3″ and 2 2″ | 2 4″ |
| No. 8 | 2 4″ | | 2 3″ and 2 2″ | 2 4″ |
| No. 9 | 2 4″ | | 4 3″ and 2 2″ | 2 4″ |
| No. 10 | 2 4″ | | 4 3″ and 2 2″ | 2 4″ |




"C" Series

**Carton Steam Boiler.**

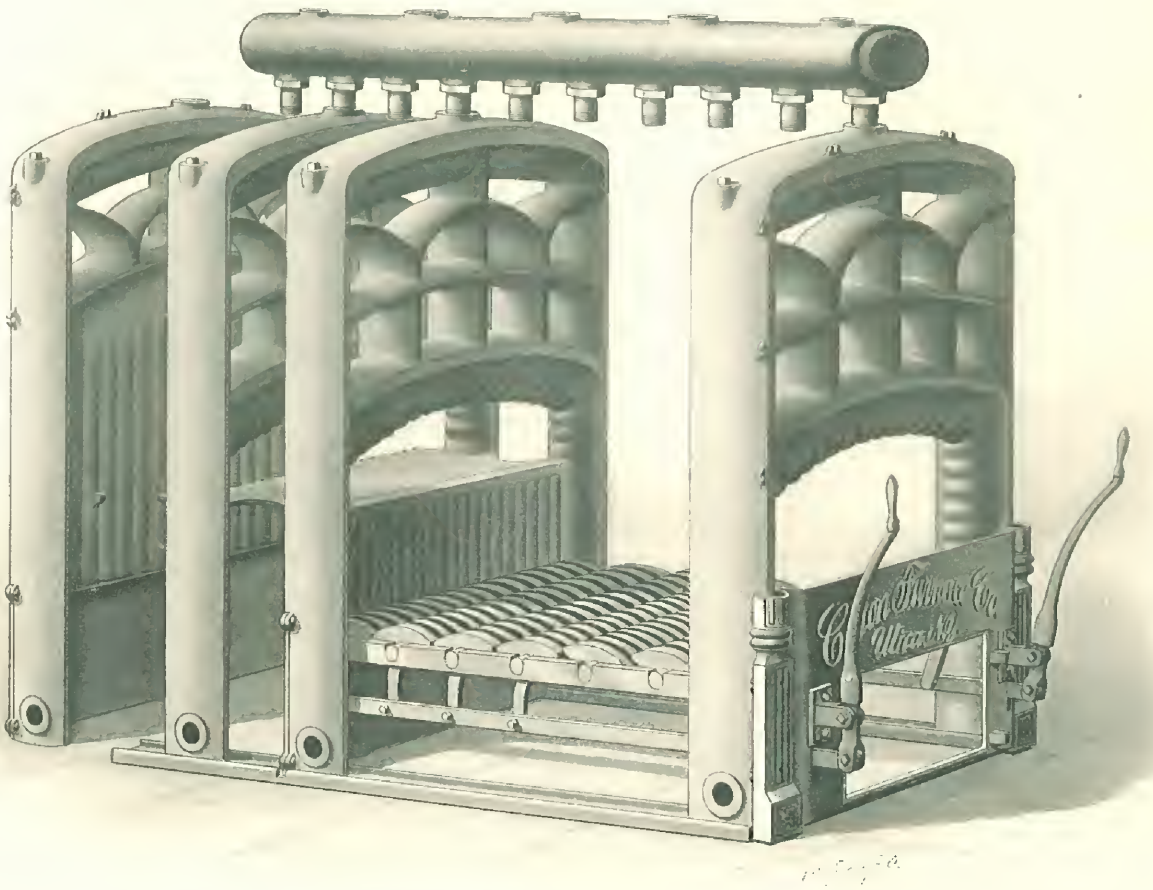
Exterior View.




"C" Series

**Carton Steam Boiler.**

Cut Away View.



"C" Series

**Carton Steam Boiler.**

Set Up View.

# Carton "D" Series

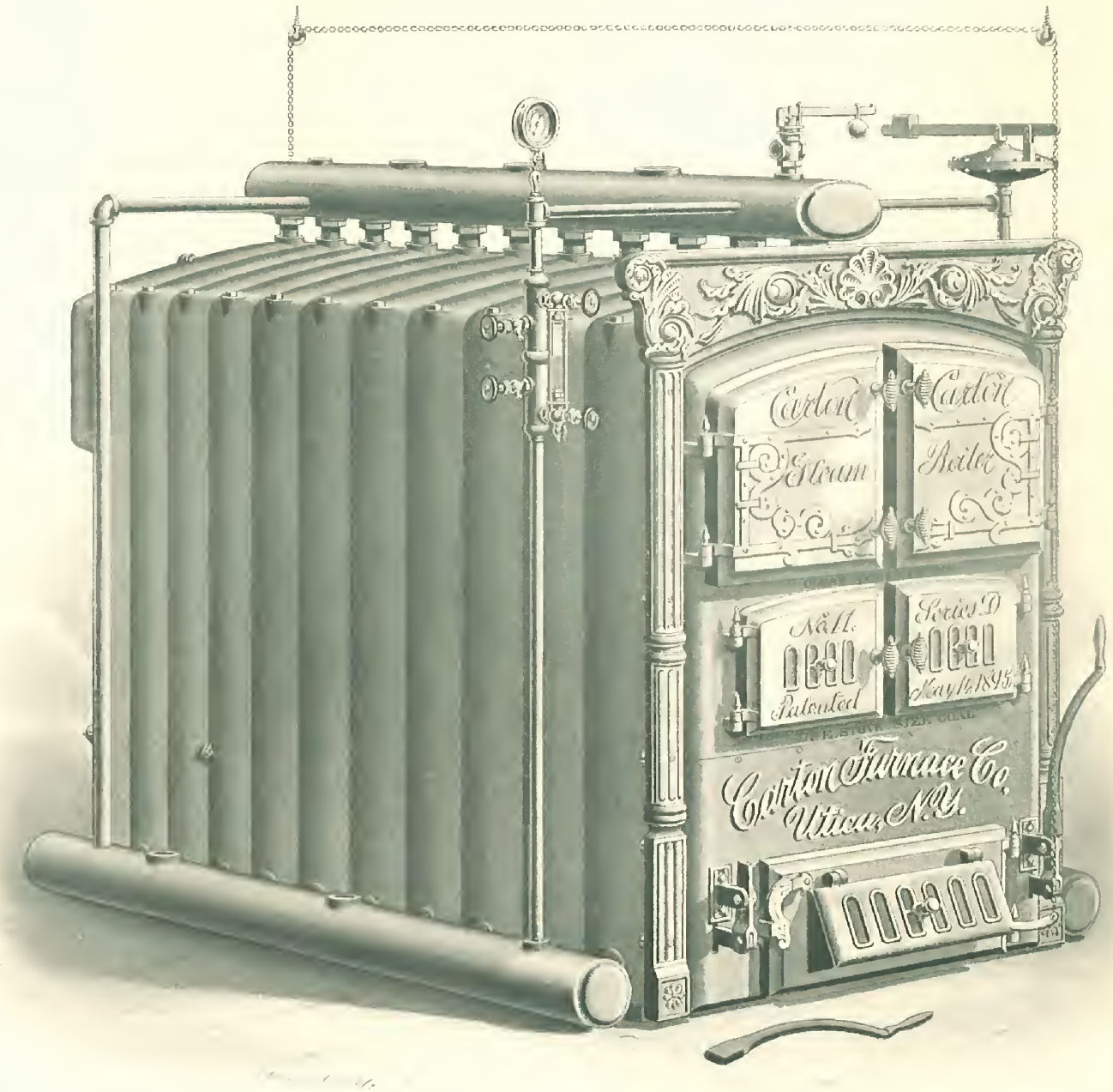
## Steam Heater.

### Dimensions, Capacities, Price List.

| Designating Number. | No. 7 | No. 8 | No. 9 | No. 10 | No. 11 |
|---|---|---|---|---|---|
| Number of Sections. | 7 | 8 | 9 | 10 | 11 |
| Depth of Sections. ...Inches | 8 | 8 | 8 | 8 | 8 |
| Size of Grate. .Inches | 40×41 | 40×44 | 40×52 | 40×52 | 40×60 |
| Height of Water Line. .Inches | 55 | 55 | 55 | 55 | 55 |
| Height of Heater, including Drum. .Inches | 82 | 82 | 82 | 82 | 82 |
| Width of Heater, including Drums. .Inches | 67 | 67 | 67 | 67 | 67 |
| Length of Heater, including Flue Box...Inches | 65 | 73 | 81 | 89 | 97 |
| Diameter of Smoke Pipe,..... Inches | 16 | 16 | 20 | 20 | 20 |
| Direct Radiation, with Connecting Pipes Covered,.....Square Feet | 1900 | 2200 | 2500 | 2800 | 3100 |
| Shipping Weight, .....Pounds | 7560 | 8340 | 9230 | 10010 | 10860 |
| Price List, with Trimmings, F. O. B. Utica, N. Y., | $1481 | $1635 | $1810 | $1965 | $2130 |

### Regular Tappings from Supply and Return Drums.

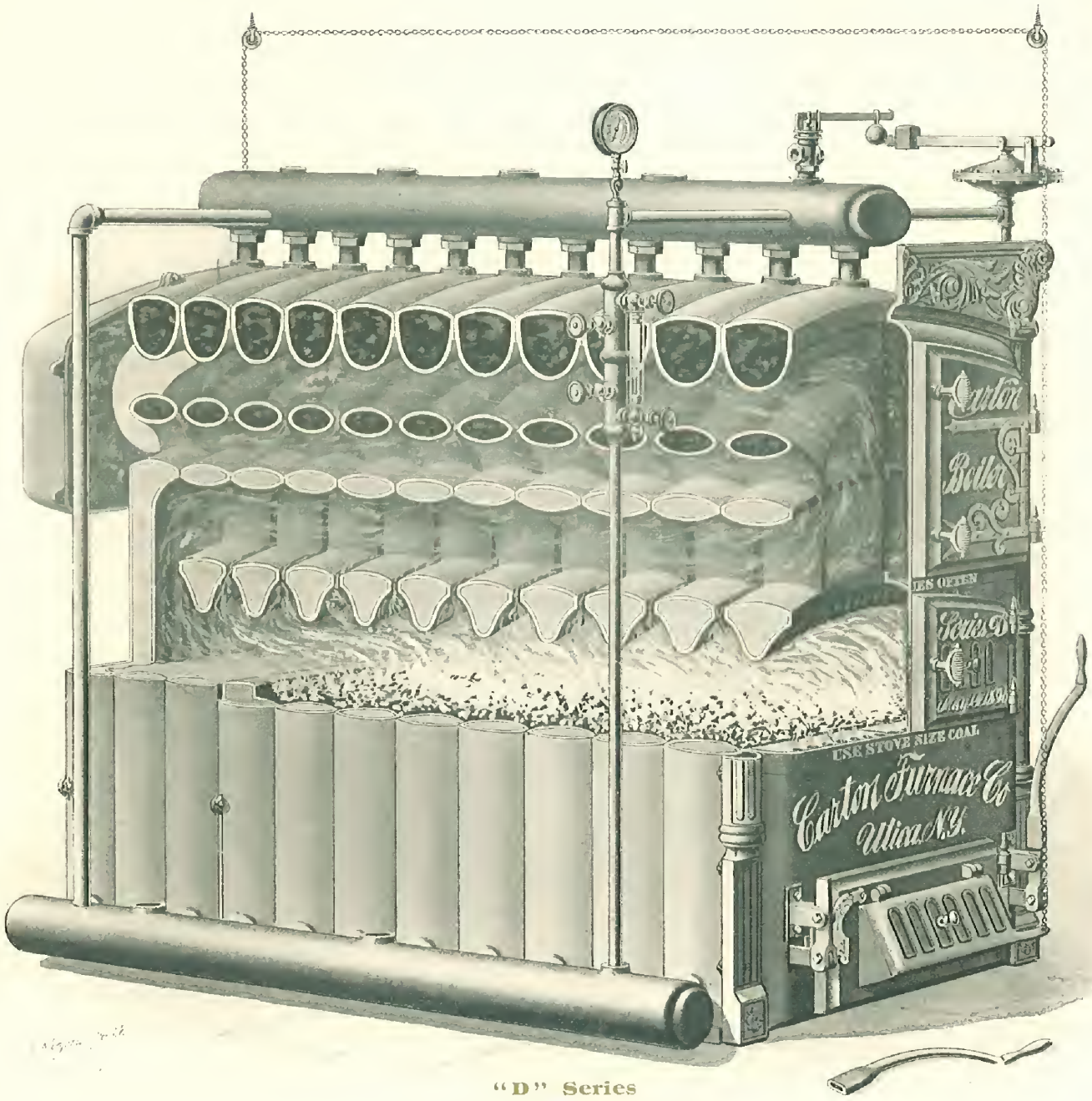
| | SUPPLY DRUM. | | RETURN DRUMS. | |
|---|---|---|---|---|
| Designating Number of Heater. | Tappings on Top of Drum. | Tapping on Back End of Drum. | Total Top Tappings of Both Drums. | Total Back End Tappings on Both Drums. |
| No. 7 | 2 3″ | We can furnish for all sizes special tappings on back end of Drum up to and including 4 inch. | 2 3″ and 2 2″ | 2 4″ |
| No. 8 | 2 4″ | | 2 3″ and 2 2″ | 2 4″ |
| No. 9 | 2 4″ | | 4 3″ and 2 2″ | 2 4″ |
| No. 10 | 2 4″ | | 4 3″ and 2 2″ | 2 4″ |
| No. 11 | 2 4″ | | 4 3″ and 2 2″ | 2 4″ |




"D" Series

**Carton Steam Boiler.**

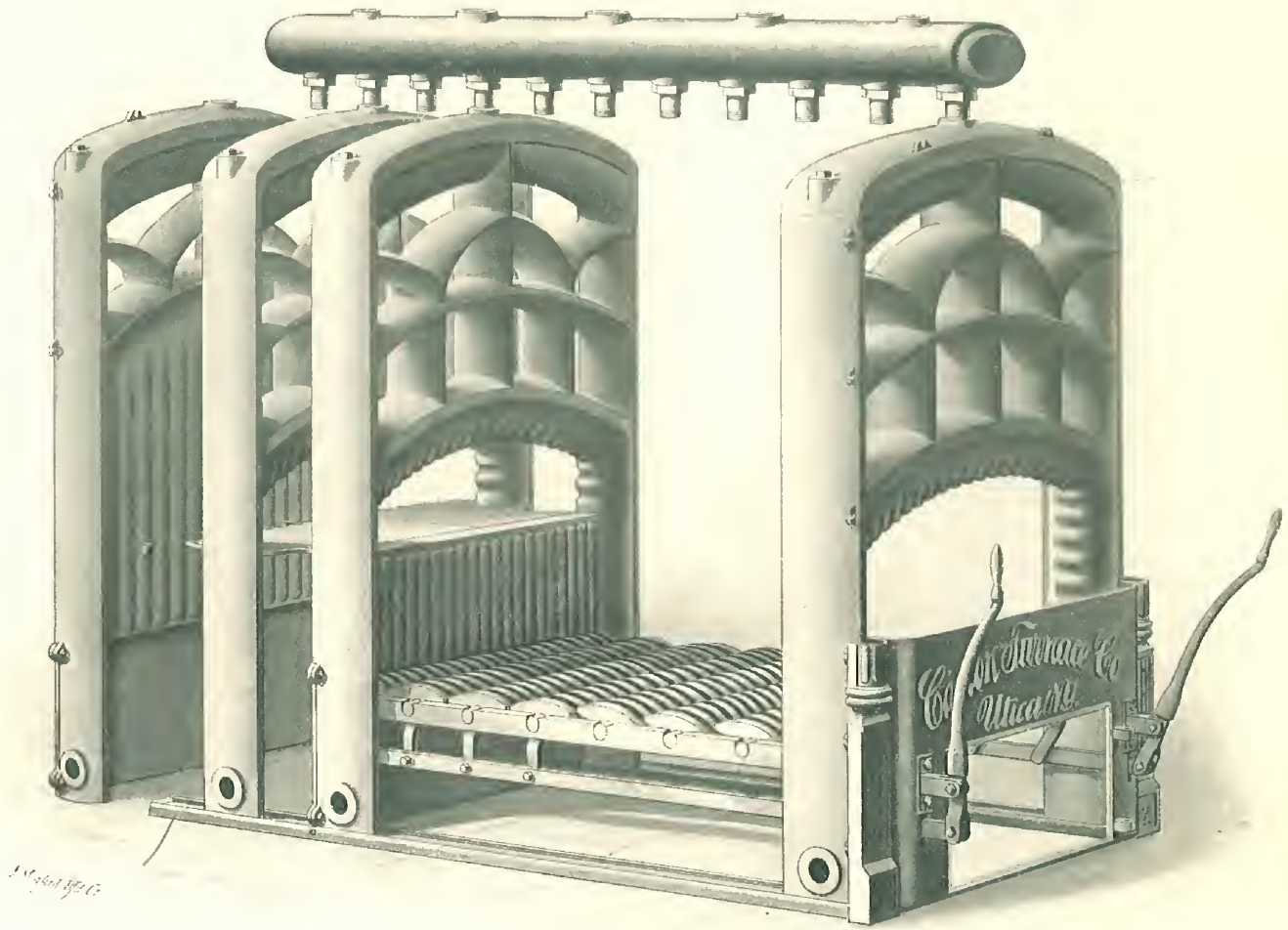
Exterior View.




"D" Series

**Carton Steam Boiler.**

Cut Away View.



"D" Series

**Carton Steam Boiler.**

Set Up View.

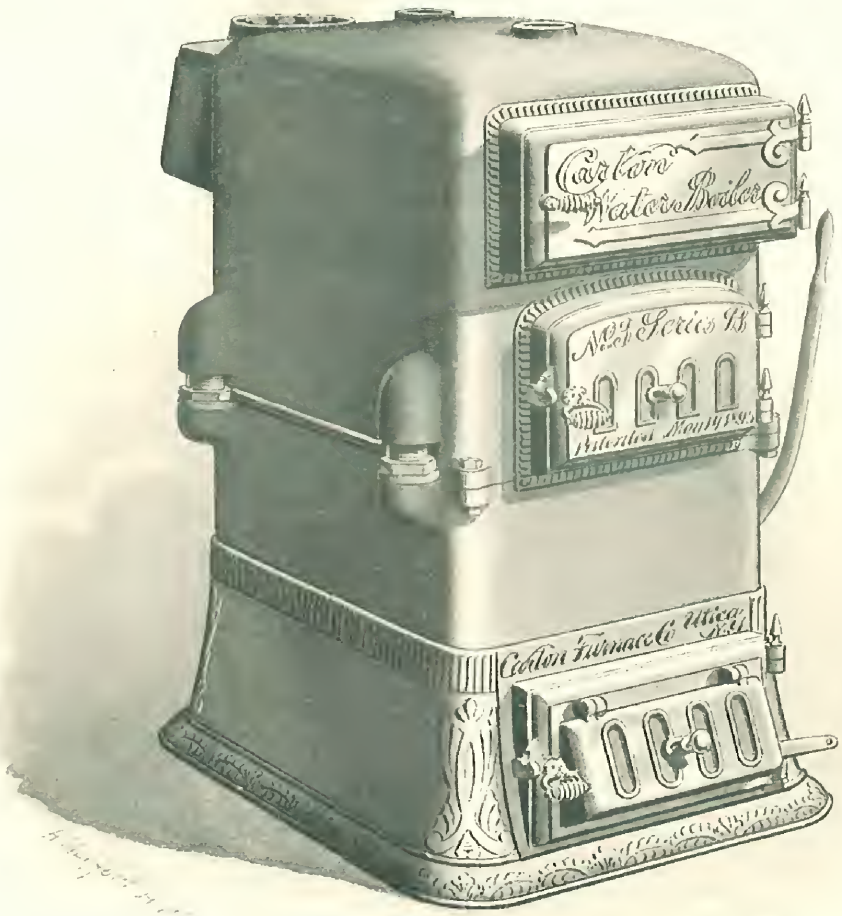
# Hot Water Heaters.

# Carton "B" Series

## Hot Water Heater.

### Dimensions, Capacities, Tappings, Price List.

| Designating Number, | | No. 1 | No. 3 | No. 5 |
|---|---|---|---|---|
| Size of Grate, | Inches | 12 × 16 | 16 × 20 | 20 × 24 |
| Height of Heater, | Inches | 48½ | 50 | 55 |
| Width of Heater, | Inches | 26½ | 31 | 35 |
| Length of Heater including Flue Box, | Inches | 37 | 43 | 47½ |
| Diameter of Smoke Pipe, | Inches | 7 | 8 | 9 |
| Supply Tapping, | | 1 3″ | 2 2½″ | 2 2½″ |
| Return Tapping, | | 1 3″ | 2 2½″ | 2 2½″ |
| Direct Radiation, with Connecting Pipes Covered, | Square Feet | 250 | 400 | 650 |
| Shipping Weight, | Pounds | 970 | 1360 | 1880 |
| Price List, F. O. B. Utica, N. Y., | | $180 | $250 | $350 |




"B" Series

**Carton Hot Water Boiler.**

Exterior View.

# Carton "B" Series

## Hot Water Heaters.

### General Description.

This series, as will be seen by illustrations, is constructed practically in three pieces,—ash pit, fire pot, and dome sections. We provide a cast-iron base plate into which the ash pit is set. The ash pit is roomy and of sufficient height to protect the grate. The fire pot section is corrugated on its four sides, insuring good combustion of the fuel on the outer edges of the fire. This section is hollow and the return connection is provided for in the back.

### The Lock-Nut Nipple Connections

Connecting the fire pot section to the dome section is a distinctive feature of this heater. These connections are made at each corner of the heater and not in any way exposed to the fire, being all on the outside of the heater. There are no internal connections. These connections are tight and they remain so.

### The Dome Section

Contains two distinctive features, to wit: the flue construction and the formation of the crown sheet. The flues are so arranged that we do not divide the combustion or cause any conflict of the currents in passing to the smoke box (see illustration) in the rear of the heater. The combustion is concentrated in being drawn to the center vertical flue from the rear of the crown sheet, thence forward (see illustration) in the front of the heater, returning to the smoke box in the rear of the boiler by the two side flues. We have aimed to retain as large an amount of boiler surface in this heater as possible by forming the front flue with a flue box extending in front of the heater and next by the formation of our

### Crown Sheet.

It will be seen by illustration that this crown sheet is made up of a series of V-shaped curved corrugations extending across the boiler in direct opposition to the fire travel. They extend three inches down into the combustion chamber. We think the advantage of such a large amount of direct fire boiler surface can be appreciated without emphasis on our part, and it must be conceded that this crown sheet represents an exceptional amount of fire surface subjected to the direct radiant rays of heat from the surface of the fire. The feeder door and flue door are made large.


"B" Series

**Carton Hot Water Boiler.**

Cut Away View.

## Erection.

In erecting this boiler in the cellar it is simply necessary after placing the base plate on a perfectly level foundation, to place the ash pit on the same, and place over the same the fire pot and dome sections, which are shipped connected. After the doors and smoke box have been properly cemented and attached, the heater is ready to be connected to the piping.

This heater is of such dimensions as to be easily carried into any ordinary cellar, and is so simple that its erection can be easily and quickly accomplished.

## The Grates,

As shown in illustration, are the same as used in our other heaters, which are so easily operated, insuring a bright grate surface and perfect combustion. They are strong and durable, but in case of an accident they can be easily replaced. These grates are adapted to hard or soft coal fuel.

## Shipping.

In shipping these heaters, the dome and fire pot sections are shipped connected, as one piece of casting; the ash pit and base separate, and other parts are boxed.

## General Points.

Vertical circulation, large area of fire surface, liberal flue capacity, tight connections, large feed and flue doors, easily cleaned, good combustion chamber, economical in fuel, and easily managed.

## Erection.

In erecting this boiler in the cellar it is simply necessary after placing the base plate on a perfectly level foundation, to place the ash pit on the same, and place over the same the fire pot and dome sections, which are shipped connected. After the doors and smoke box have been properly cemented and attached, the heater is ready to be connected to the piping.

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## General Points.

Vertical circulation, large area of fire surface, liberal flue capacity, tight connections, large feed and flue doors, easily cleaned, good combustion chamber, economical in fuel, and easily managed.

"B" Series

**Carton Hot Water Boiler.**

View of Grate.

# Carton "B" Series

## Hot Water Heaters

### For Greenhouses and Conservatories.

These heaters are particularly adapted for greenhouses and conservatories and we highly recommend them for this purpose.

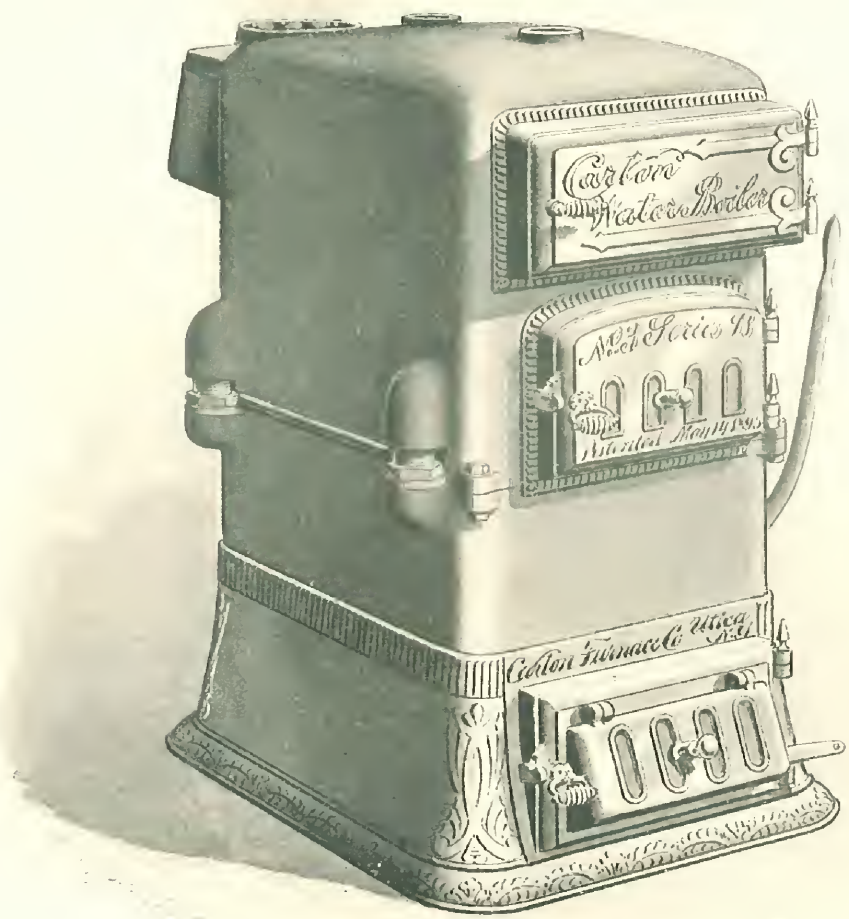
The circulation can be made with wrought iron pipe or the regular four-inch cast iron pipe.

The regular tappings can be yoked together or four-inch cast iron hubs can be used.

These heaters are the same in construction as the regular pattern illustrated and described on preceding pages 35 to 39 inclusive.

### Dimensions, Capacities, Tappings, Price List.

| | | | |
|---|---|---|---|
| Designating Number, | No. 1 | No. 3 | No. 5 |
| Size of Grate, Inches | 12×16 | 16×20 | 20×24 |
| Height of Heater, Inches | 48½ | 50 | 55 |
| Width of Heater, Inches | 26½ | 31 | 35 |
| Length of Heater, including Flue Box, Inches | 37 | 43 | 47½ |
| Diameter of Smoke Pipe, Inches | 7 | 8 | 9 |
| Supply Tappings, | 1 3" | 2 2½" | 2 2½" |
| Return Tappings, | 1 3" | 2 2½" | 2 2½" |
| Square Feet of Glass Surface, | 800 | 1300 | 2000 |
| Shipping Weight, Pounds | 970 | 1360 | 1880 |
| Price List, F. O. B. Utica, N. Y., | $180 | $250 | $350 |




"B" Series

## Carton Hot Water Greenhouse Heater.

Exterior View.

# Carton "A," "C," and "D" Series

## Sectional Hot Water Heaters.

### A Proven Claim.

In the construction of these heaters we have spared no expense, and our efforts have resulted in producing hot water heaters with more positive and effective boiler surface than can be found in any form of cast-iron sectional boiler on the market. The test on the steam boilers of this construction, as shown on page 17, 18, and 19, apply equally well to these hot water heaters, their construction being the same. An evaporation of "11.07 pounds of water per pound of combustible" cannot be surpassed. We challenge comparison. It will also be noticed in this test that the temperature of the gases of combustion, entering the chimney flue, range from three degrees to twenty-one degrees above the temperature of the steam, which fact alone proves our emphatic claim that these boilers utilize about all the available heat from the fuel. We are not taking an exaggerated or irrational claim that cannot be proven.

### The Ash Pits

Of these boilers are surrounded by water, as the water legs of the fire box extend down to the floor line, and by this construction all the heat given off at the bottom of the grates and from the heated ashes is absorbed. The water does not return into the heater above the grate line, but is connected into the water legs at the bottom of the ash pit, where the water is cooler than above the grate line. Ample room is provided under the grates, but, if desired, any depth of ash pit may be had by constructing ash pit below bottom of water legs. The sections stand on bed plates provided, which insures a good level foundation for the heater to stand on, bringing the nipples true to the drum tappings and requiring but a short time to set up the heater.

### The Fire Box

Is large and roomy. The "A" and "C" Series have large single feed doors and the "D" Series has two large feed doors. The feed doors are made perfectly tight by heavy turn keys at top and bottom, and we also provide expansion flanges around the entire opening of the feed door, which the feed door fits over, making a perfect fit. The flue doors are lined with heavy perforated hollow plates on the inside and filled with non-heat-conducting cement. The sides and back of fire box are double corrugated, adding to the direct fire surface, giving greater strength to the castings, and insuring combustion on all sides of the fire

box. The front of the fire box between the bottom of feed door and grate is provided with hollow sectional cast-iron plates (see illustration) made heavy and strongly stayed and with openings at top and bottom, which provides for a continual flow of air through these hollow plates between them and the boiler front. This current of air not only preserves the plates but acts as a hot blast and aids the combustion of the gases, preventing any dead fire in the extreme front of the fire box.

**The Crown Sheet**

is constructed with a series of drop V-shaped corrugations, arched at the center so that they drain at either side. These V-shaped corrugations are 6 inches in depth and 6 inches apart in the "A" Series, and 8 inches in depth and 8 inches apart in the "C" and "D" Series. They not only add strength to the water legs but add largely to the direct fire surface, and we claim this to be the most effective crown sheet on any boiler yet in the market. The water in these V-shaped corrugations absorbs the heat very rapidly, causing an immediate circulation in the vertical waterways forming the top of these corrugations. It is surprising how quickly the water will circulate in these heaters when the draft is put on, the effect seeming instantaneous. There is no overshadowed surface on this crown sheet.

**The Combustion Travel.**

The intermediate and bridge wall sections are cut away in the lower set of flues so that the combustion is partially drawn up through and between the sections into the lower set of flues, which removes all dead surface, making this lower set of flues all fire surface, and being subjected to the direct radiant rays of heat from the surface of the fire. This insures a high temperature of the gases in this lower set of flues and increases the temperature of the gases in the top series of flues, which are also slightly cut away between the flues, removing any dead boiler surface where the flues come together. The arched waterways forming the bottom of this top set of flues come together section to section, thereby separating the bottom set of flues from the top set of flues. The combustion is also carried to the flue in the back of the combustion chamber, thence to the front of the boiler and returning again to the back of the boiler in the six top flues concentrated in the smoke box (see illustration) on the back of the boiler. We maintain a long fire travel in the boiler three times the length of the heater, but at the same time we do not condense the flue gases to a degree where they are detrimental in the heater; a point of merit which is a special feature in these heaters. The flue spaces are of such capacity that perfect combustion is easily obtained with a moderate fire.

### The Upper Tier of Waterways.

By the series of arches in these upper waterways we maintain an internal circulation within the heater. This peculiar construction is a feature of these heaters and can be readily appreciated by the practical heating engineer or fitter.

### The Cleaning of the Flues

Has been carefully provided for. The "A" Series is provided with one and the "C" and "D" Series with two extra large flue doors. By means of these doors the entire front and flues of the heater are exposed, and the heater can be perfectly cleaned under any condition of the fire in a few moments' time. In cleaning the flues the draft being in no ashes or soot will come into the cellar. This point is worthy of careful consideration.

### Vertical Circulation.

By the following illustration it will be readily seen that the circulation in these heaters is all vertical and positive. The circulation through the vertical waterways from the crown sheet is very rapid, and the boiler surface being so largely exposed to the direct radiant rays of heat from the surface of the fire, the heat is conducted, or transmitted, to the water very quickly; there being only a small percentage of the boiler surface that is overshadowed, hence the rapidity of the circulation through the vertical waterways can be appreciated.

We are not making an exaggerated claim in this statement that the effect of heat on this boiler surface, as we have it arrranged, is instantaneous.

### Lock-Nut Nipple Connections.

Each section is a separate and independent boiler. There are no internal connections, no gaskets or packed joint connections; all connections are on the outside of the heater, away from the heat. The flow and return headers are connected to the heater by 2 inch lock-nut nipples in the "A" Series, and 2½ inch in the "C" and "D" Series, upon one end of which is cut a standard taper thread, and upon the other end is cut a straight or running thread, which is made tight with the lock nut packed with asbestos wicking and red lead.

### The Sections,

As will be noticed by illustration, are very strong. The curved arched waterways give great strength to the casting. The water back section is heavily corrugated on its flat surface and is also well stayed in the waterway of this flat surface. We have never known one of these intermediate or water back sections to crack. The depth of these sections in the "A" Series is 6 inches, and in the "C" and "D" Series, 8 inches.

### Heights of Heaters.

We have carefully considered this point in the construction of these heaters, and have made them as low as is consistent with the more vital requisites, to wit: proper depth of ash pit, fire pot, and combustion chamber, and flue space, believing from experience that in the construction of boilers the gases should continually rise from the combustion chamber, thereby maintaining a higher temperature, instead of being condensed and their temperature lowered by being reverted into lower flues, near the base of the heater. Comparatively cool gases in boiler flues is an exploded theory; a practical experiment will prove the fallacy of such a claim.

### The Grates

Are illustrated in the "set-up" views following. They are built very strong, and are adapted to burning soft or hard coal, or wood. They operate very easily and perfectly clean the grate surface of ashes and clinkers without disturbing or packing the fuel too tightly together to prevent good combustion. There is no necessity of dumping the grate, but if for any reason this is desired, the lever handle can be drawn forward far enough to allow the grates to stand vertical, and in this way dump into the ash pit the entire contents of the fire box without disturbing the grate. In the "A" Series the grates are operated with one lever handle, and in the "C" and "D" Series with two; the front grates are operated with one and the back grates with the other. The grates are easily replaced in case of an accident, being drawn out from the front of the heater by simply removing the lower piece of the front, not necessitating working to a disadvantage through the feed door. On account of the large size of the grate bars in the "C" and "D" Series, we have provided for drawing them out in pairs and threes, so that even with these extremely large grates it is a simple matter to replace them. The proper ratio of grate to boiler surface has been carefully considered, and our conclusion is the result of a thorough study of this important feature, and repeated experiments to prove the correctness of our theory. In the "set-up" views on the following pages will be seen the provision we have made by the bridge-wall section, and our directions on mounting these heaters will explain where this bridge-wall section is placed in the different size heaters.

### Boiler Covering.

We furnish with each of these heaters a sufficient amount of the best non-conducting heat substance to properly cover the heater and drums 1½ inches thick.

### These Heaters

Are self-contained, free from all joints, no brick work, large combustion chamber, large direct fire surface, large flues, vertical circulation, ample depth of ash pit, easily cleaned, perfect in workmanship and operation.

# Carton "A" Series

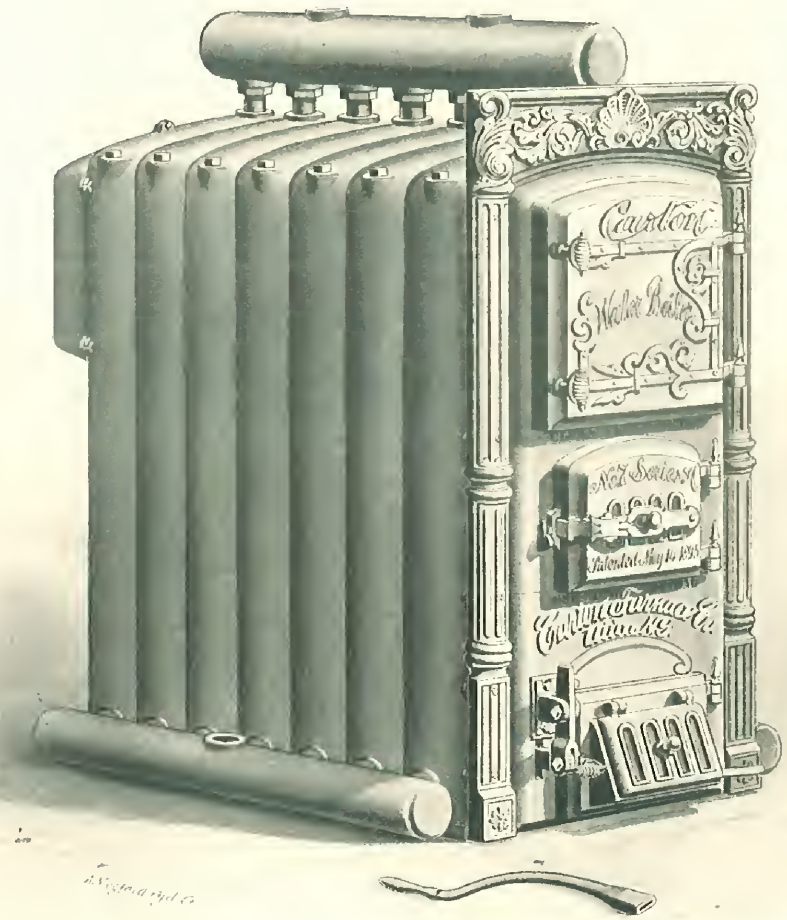
## Hot Water Heater.

### Dimensions, Capacities, Price List.

| Designating Number, | | No. 4 | No. 5 | No. 6 | No. 7 | No. 8 |
|---|---|---|---|---|---|---|
| Number of Sections, | | 4 | 5 | 6 | 7 | 8 |
| Depth of Sections, | Inches | 6 | 6 | 6 | 6 | 6 |
| Size of Grate, | Inches | 20 x 21 | 20 x 27 | 20 x 33 | 20 x 39 | 20 x 45 |
| Height of Heater, including Drum, | Inches | 60 | 70 | 70 | 70 | 70 |
| Width of Heater, including Drums, | Inches | 42 | 42 | 42 | 42 | 42 |
| Length of Heater, including Flue Box, | Inches | 31 | 37 | 43 | 49 | 55 |
| Diameter of Smoke Pipe, | Inches | 8 | 9 | 10 | 10 | 12 |
| Direct Radiation, with Connecting Pipes Covered, | Square Feet | 600 | 800 | 1000 | 1200 | 1400 |
| Shipping Weight, | Pounds | 2170 | 2530 | 2890 | 3250 | 3610 |
| Price List, F. O. B. Utica, N. Y., | | $408 | $480 | $552 | $624 | $694 |

### Regular Tappings from Supply and Return Drums.

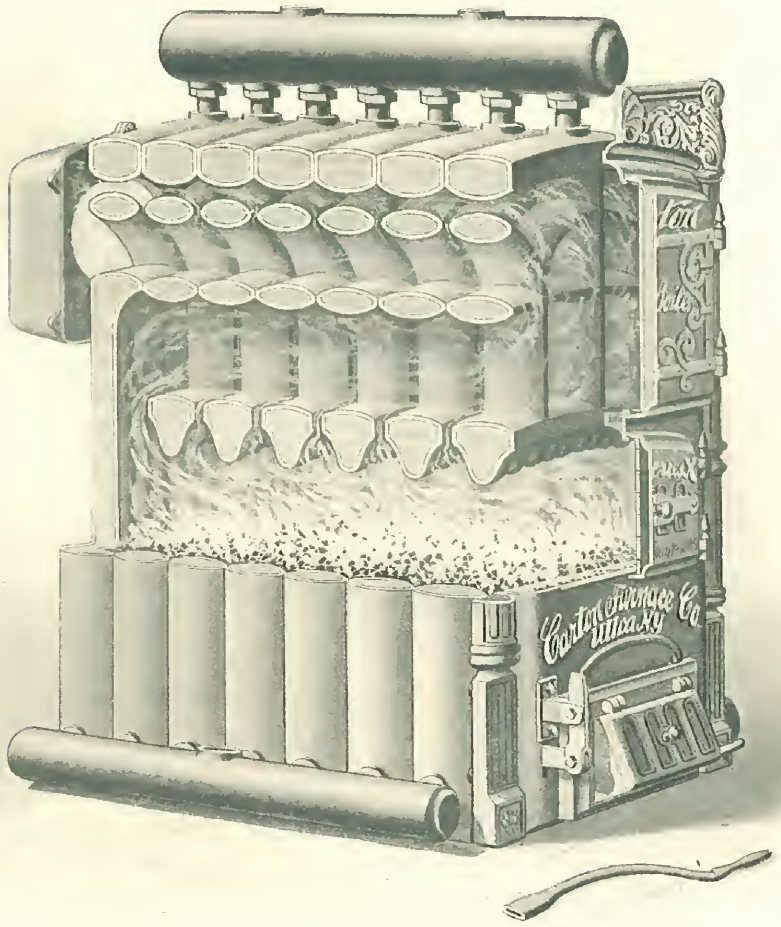
| | SUPPLY DRUM. | | RETURN DRUMS. | |
|---|---|---|---|---|
| Designating Number of Heater. | Tappings on Top of Drum. | Tapping on Back End of Drum. | Total Top Tappings of Both Drums. | Total Back End Tappings on Both Drums. |
| No. 4 | 2 3″ | 1 4″ | No top tapping. | 2 3″ |
| No. 5 | 2 3″ | 1 4″ | 2 3″ | 2 3″ |
| No. 6 | 2 3″ | 1 4″ | 2 3″ | 2 3″ |
| No. 7 | 3 3″ | 1 4″ | 2 3″ | 2 3″ |
| No. 8 | 3 3″ | 1 4″ | 2 3″ | 2 3″ |




"A" Series

## Carton Hot Water Boiler.

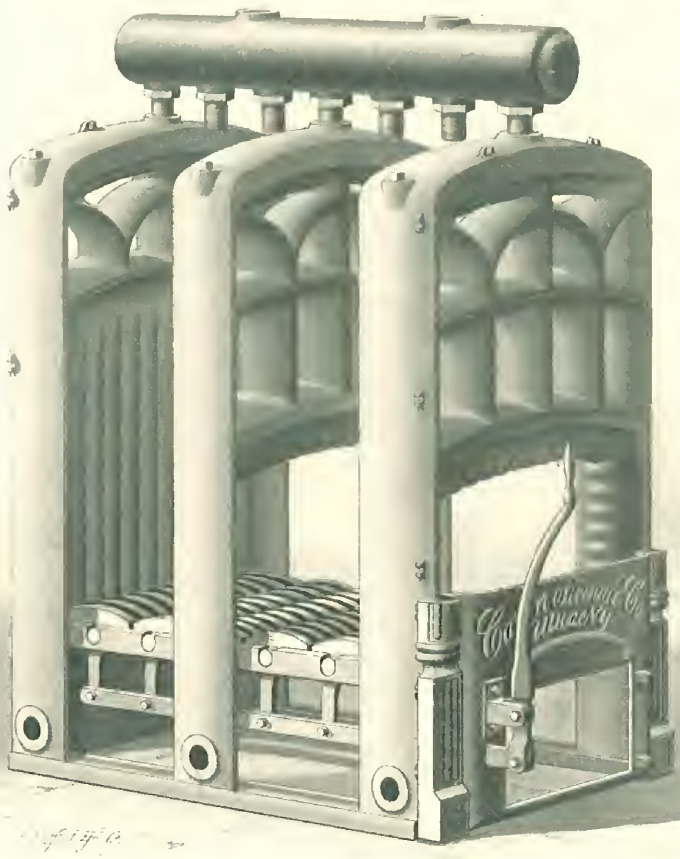
Exterior View.




"A" Series

**Carton Hot Water Boiler.**

Cut Away View.



"A" Series

## Carton Hot Water Boiler.

Set Up View.

# Carton "C" Series

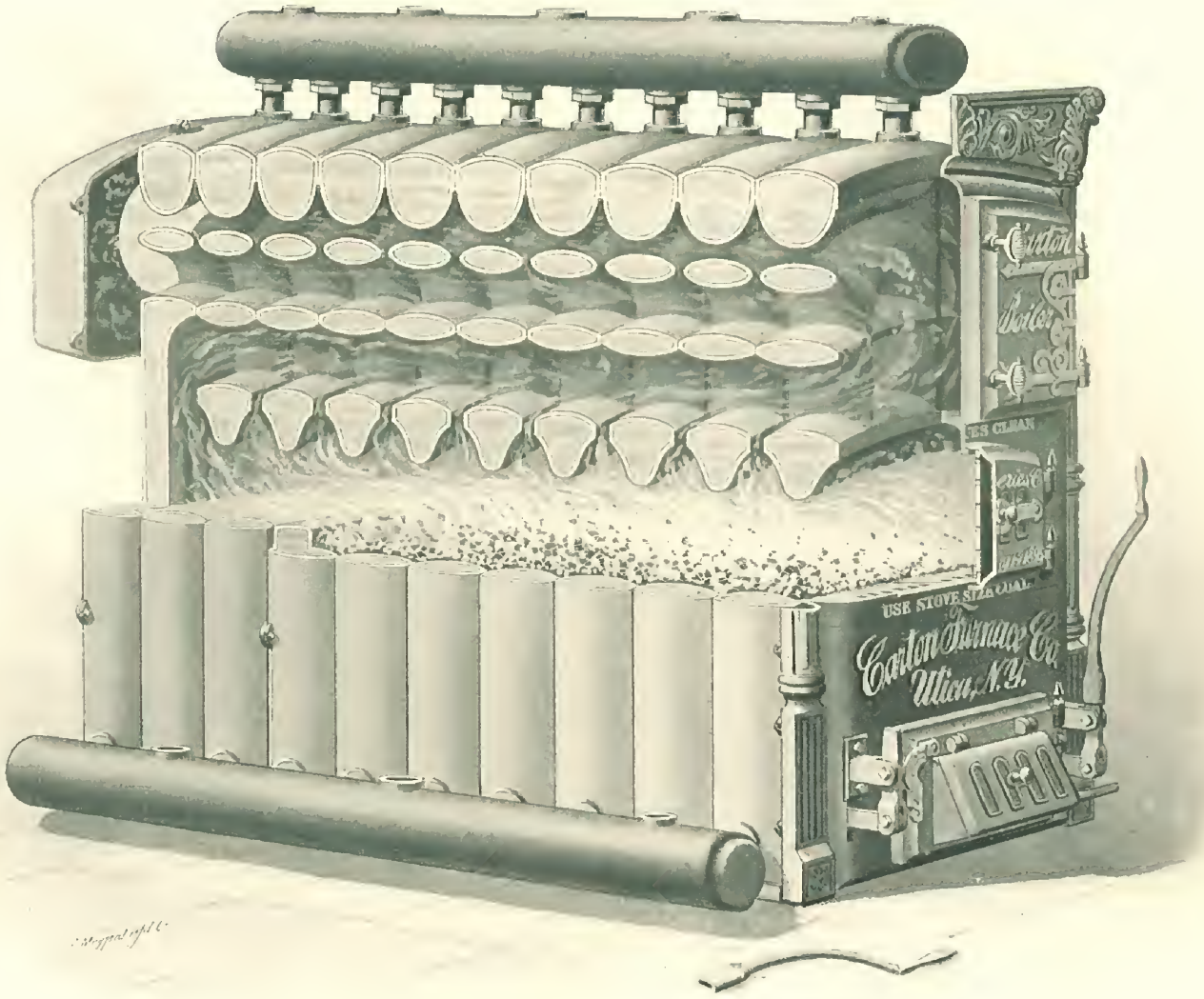
## Hot Water Heater.

### Dimensions, Capacities, Price List.

| | | | | | | |
|---|---|---|---|---|---|---|
| Designating Number, | No. 5 | No. 6 | No. 7 | No. 8 | No. 9 | No. 10 |
| Number of Sections, | 5 | 6 | 7 | 8 | 9 | 10 |
| Depth of Sections, ....Inches | 8 | 8 | 8 | 8 | 8 | 8 |
| Size of Grates, ....Inches | 30×36 | 30×36 | 30×36 | 30×44 | 30×44 | 30×52 |
| Height of Heater, including Drum, ....Inches | 73 | 73 | 73 | 73 | 73 | 73 |
| Width of Heater, including Drums, ....Inches | 56 | 56 | 56 | 56 | 56 | 56 |
| Length of Heater, including Flue Box, ..Inches | 49 | 57 | 65 | 73 | 81 | 89 |
| Diameter of Smoke Pipe, .... Inches | 12 | 12 | 12 | 14 | 14 | 14 |
| Direct Radiation, with Connecting Pipes Covered, ....Square Feet | 1500 | 1800 | 2150 | 2500 | 2900 | 3300 |
| Shipping Weight, .... Pounds | 4150 | 4940 | 5540 | 6180 | 6780 | 7410 |
| Price List, F. O. B., Utica, N. Y., .... | $798 | $956 | $1074 | $1200 | $1319 | $1446 |

### Regular Tappings from Supply and Return Drums.

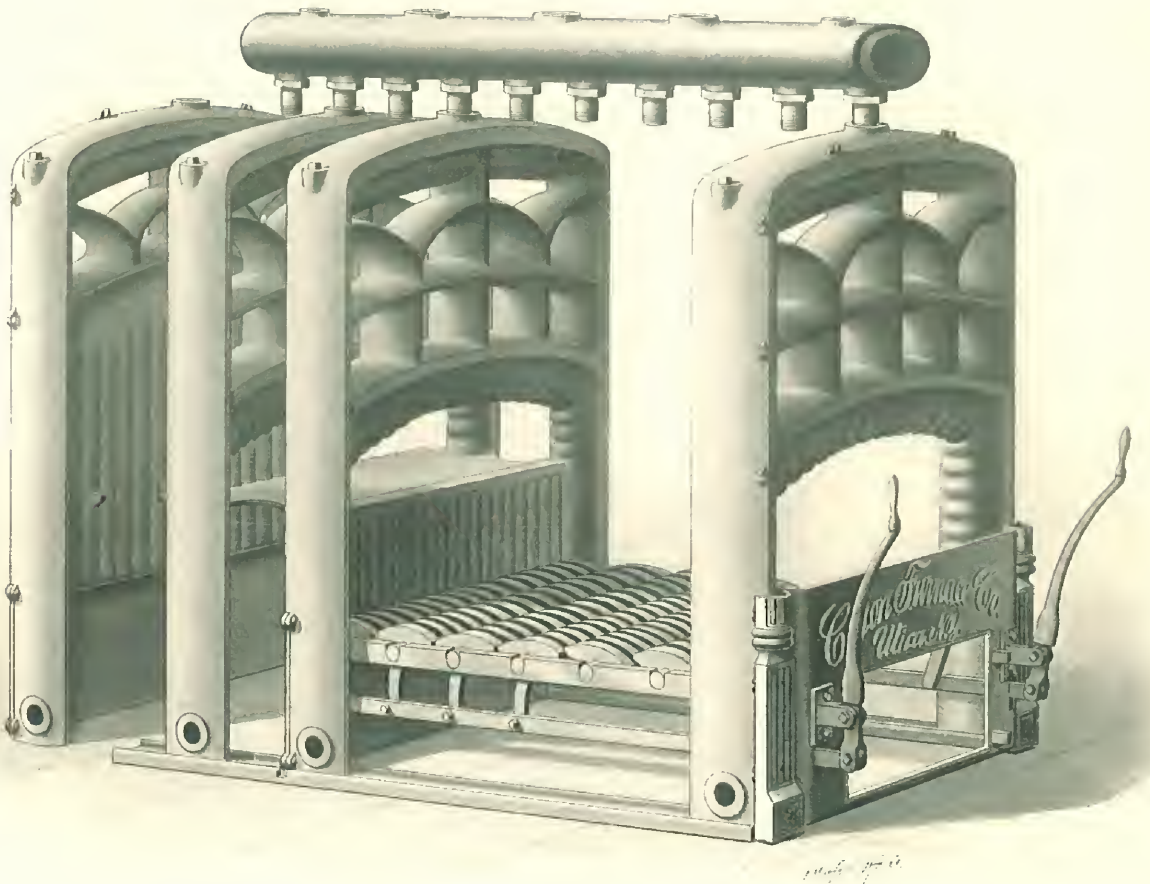
| SUPPLY DRUM. | | | RETURN DRUMS. | |
|---|---|---|---|---|
| Designating Number of Heater. | Tappings on Top of Drum. | Tapping on Back End of Drum. | Total Top Tappings of Both Drums. | Total Back End Tappings on Both Drums. |
| No. 5 | 2 3″ and 1 2″ | 1 4″ | 2 3″ and 2 2″ | 2 4″ |
| No. 6 | 2 3″ and 2 2″ | 1 4″ | 2 3″ and 2 2″ | 2 4″ |
| No. 7 | 3 3″ and 1 2″ | 1 4″ | 2 3″ and 2 2″ | 2 4″ |
| No. 8 | 3 3″ and 1 2″ | 1 4″ | 2 3″ and 2 2″ | 2 4″ |
| No. 9 | 3 4″ and 2 2″ | 1 4″ | 4 3″ and 2 2″ | 2 4″ |
| No. 10 | 3 4″ and 2 2″ | 1 4″ | 4 3″ and 2 2″ | 2 4″ |




"C" Series

**Carton Hot Water Boiler.**

Cut Away View.



"C" Series

## Carton Hot Water Boiler.

Set Up View.

# Carton "D" Series

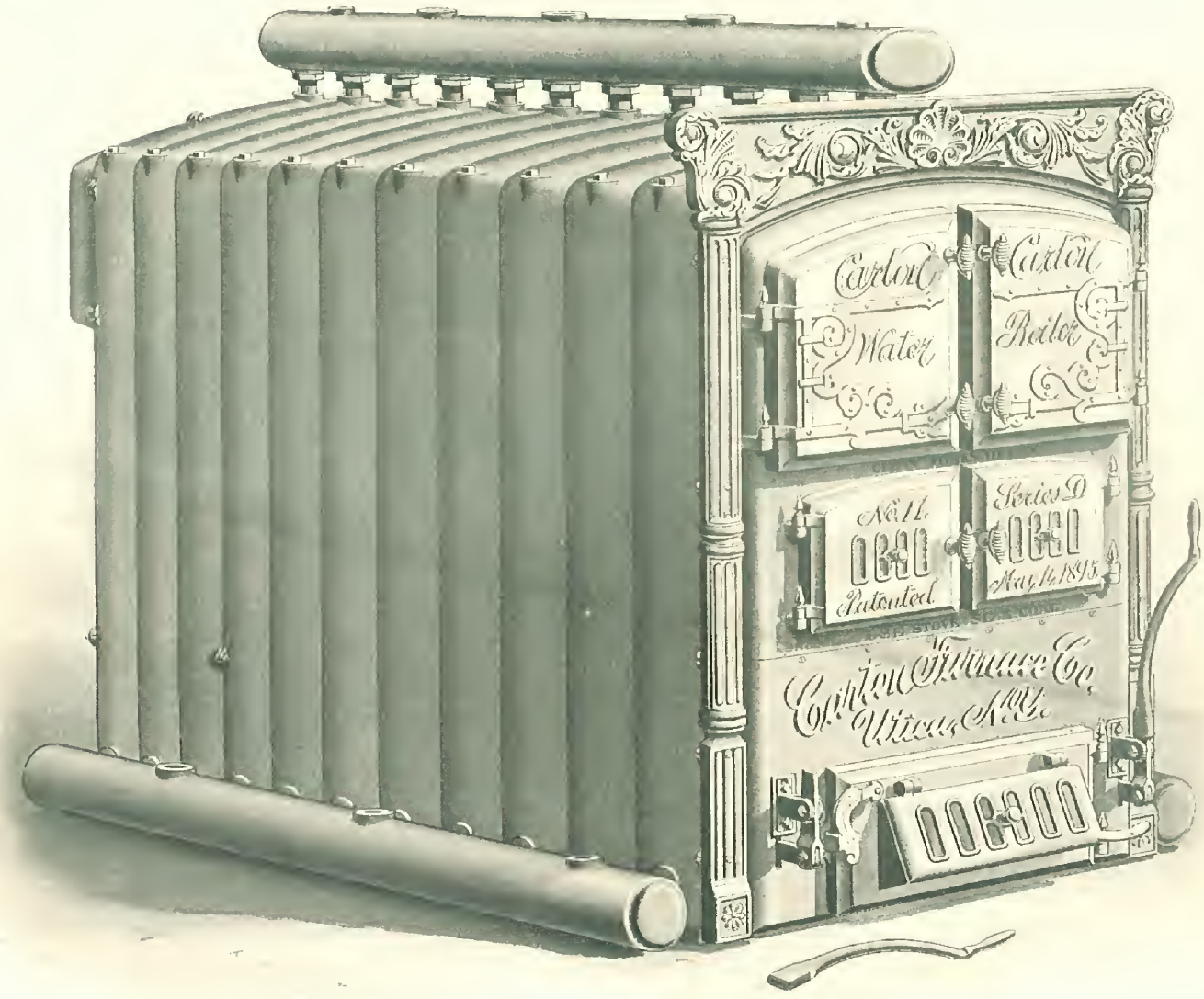
## Hot Water Heater.

### Dimensions, Capacities, Price List.

| Designating Number, | No. 7 | No. 8 | No. 9 | No. 10 | No. 11 |
|---|---|---|---|---|---|
| Number of Sections, | 7 | 8 | 9 | 10 | 11 |
| Depth of Sections, ..Inches | 8 | 8 | 8 | 8 | 8 |
| Size of Grate, ..Inches | 40×44 | 40×44 | 40×52 | 40×52 | 40×60 |
| Height of Heater, including Drum, ..Inches | 82 | 82 | 82 | 82 | 82 |
| Width of Heater, including Drums, ..Inches | 67 | 67 | 67 | 67 | 67 |
| Length of Heater, including Flue Box, ..Inches | 65 | 73 | 81 | 89 | 97 |
| Diameter of Smoke Pipe, ..Inches | 16 | 16 | 20 | 20 | 20 |
| Direct Radiation, with Connecting Pipes Covered, ..Square Feet | 3200 | 3700 | 4300 | 4800 | 5300 |
| Shipping Weight, ..Pounds | 7470 | 8250 | 9140 | 9920 | 10750 |
| Price List, F. O. B. Utica, N. Y., | $1453 | $1606 | $1782 | $1935 | $2102 |

### Regular Tappings from Supply and Return Drums.

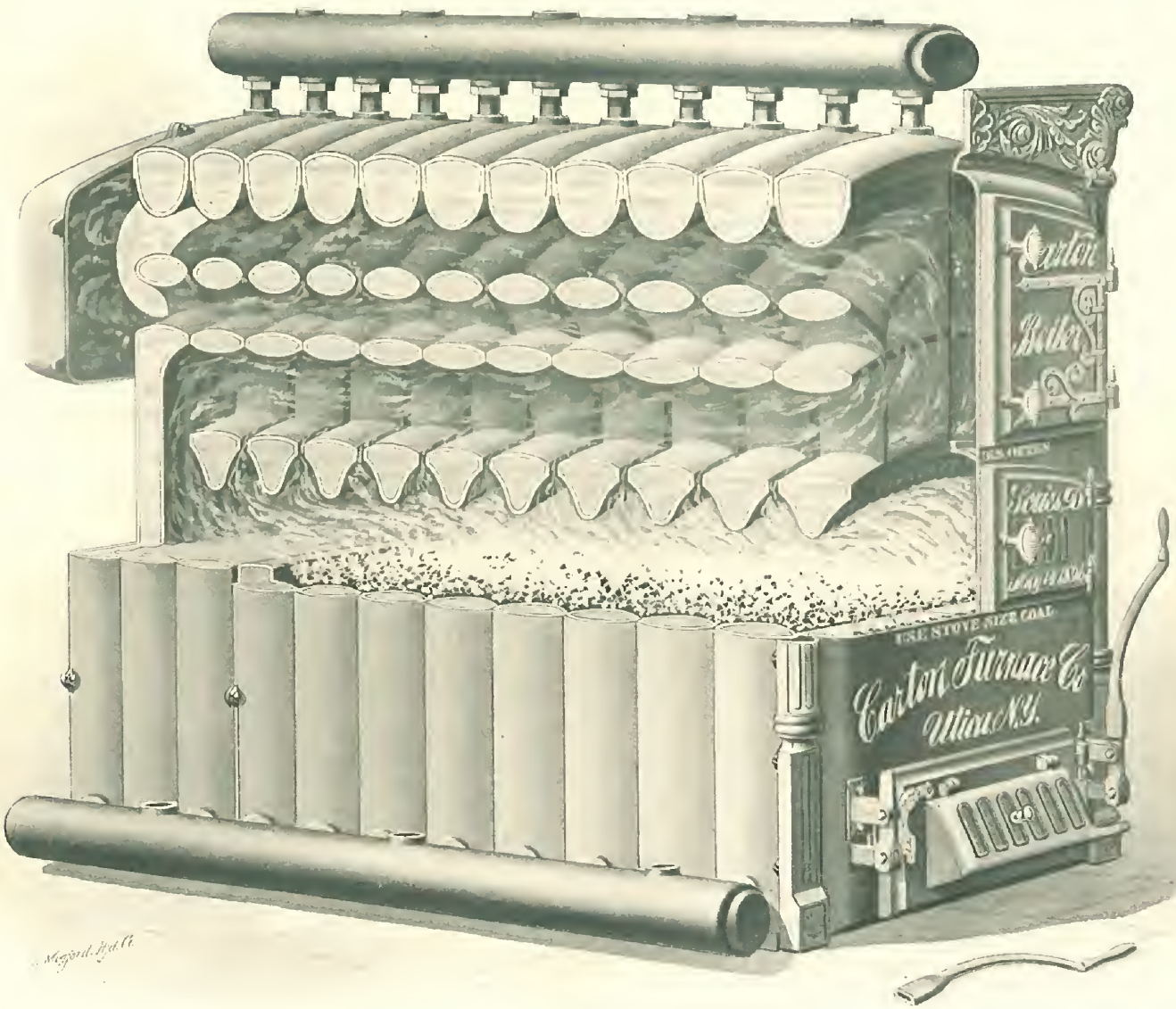
| SUPPLY DRUM. | | | RETURN DRUMS. | |
|---|---|---|---|---|
| Designating Number of Heater. | Tappings on Top of Drum. | Tapping on Back End of Drum. | Total Top Tappings of Both Drums. | Total Back End Tappings on Both Drums. |
| No. 7 | 3 3″ and 1 2″ | 1 4″ | 2 3″ and 2 2″ | 2 4″ |
| No. 8 | 3 3″ and 1 2″ | 1 4″ | 2 3″ and 2 2″ | 2 4″ |
| No. 9 | 3 4″ and 2 2″ | 1 4″ | 4 3″ and 2 2″ | 2 4″ |
| No. 10 | 3 4″ and 2 2″ | 1 4″ | 4 3″ and 2 2″ | 2 4″ |
| No. 11 | 3 4″ and 2 2″ | 1 4″ | 4 3″ and 2 2″ | 2 4″ |




"D" Series

**Carton Hot Water Boiler.**

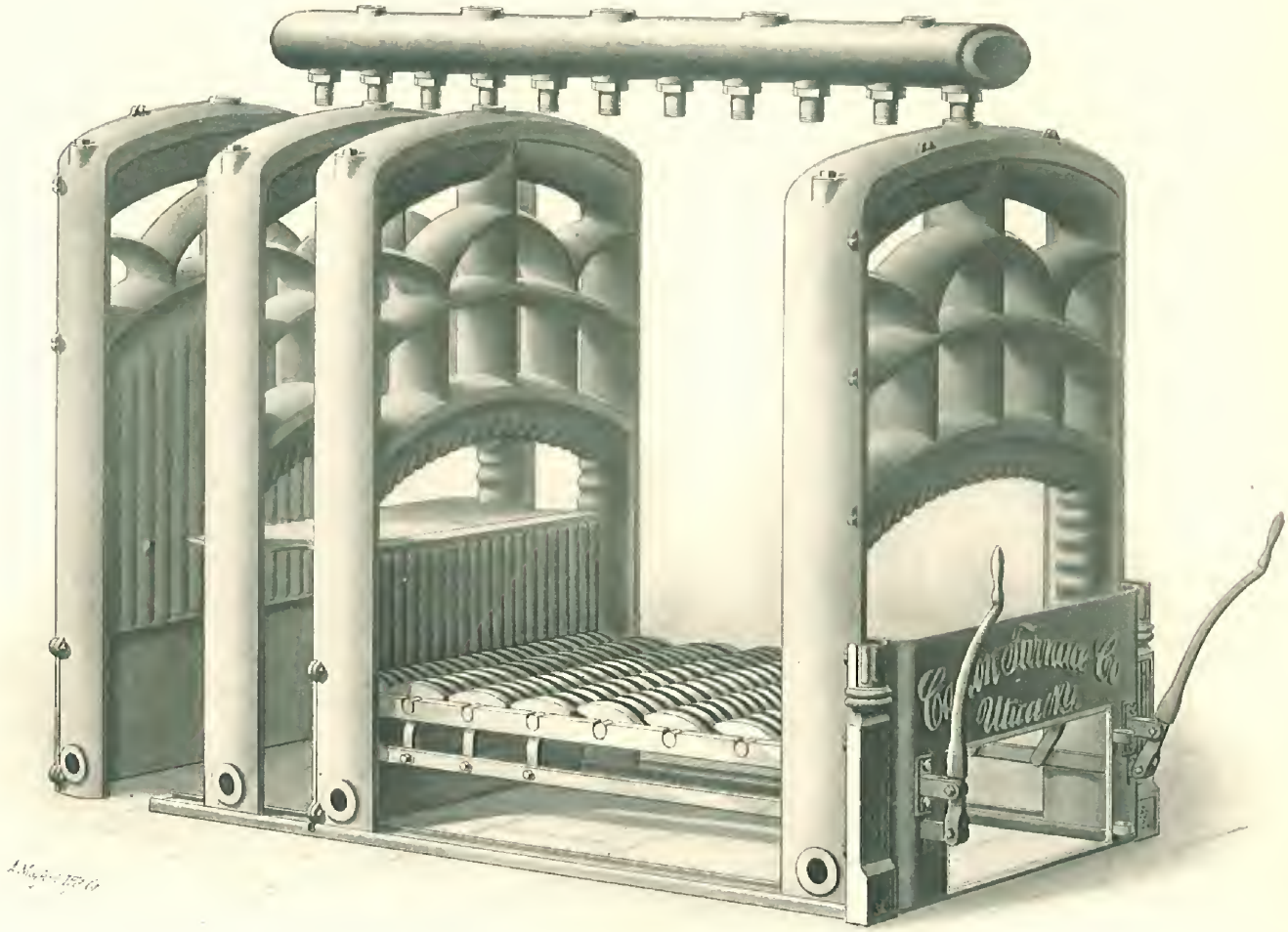
Exterior View.




"D" Series

**Carton Hot Water Boiler.**

Cut Away View.




"D" Series

**Carton Hot Water Boiler.**

Set Up View.

# Directions for Setting the Carton Steam Heaters.

### Location.

The location of the heater when practicable should be central, to reduce the length of the lateral steam mains in basement, but do not overlook the vital point of a short smoke pipe. To get the best results the heater should be set near to the chimney flue.

### Smoke Flue.

The heater should be connected to a good flue, see tabulation on page 66, and the smoke pipe must be carried the full size to the chimney flue and of the size specified for each heater in this catalogue; it must not be reduced in size.

### Foundation for Heater.

The heater should be set on a level foundation of cement or two courses of brick, depending on the nature of the ground. When cellar bottom is concreted, the brick foundation is not necessary. When a deeper ash pit is desired, leave out a few courses of brick below the ash pit, sloping up to ash pit door. This will give a greater depth of ash pit without increasing height of either. With all our sectional heaters we furnish bed plates for the sections to stand on.

### Level at which Heaters should be set.

When the system is direct radiation placed on the floor above the heater, the heater should be set at such a level as to allow the horizontal mains at their lowest point being two feet or more above the water line of heater. When indirect radiation is used, the bottom of indirect radiators should be at least eighteen inches above water line of heater; in running mains with less space than above between radiators and water line of heater, larger mains (relieved often) should be used.

### Erecting the Heater.

See that the lock nuts are run on to the long thread nipples as far as they will go, then screw the nipples into the headers, turning them till the lock nut strikes the shoulder of the header. This should be done to all, with the exception of the nipples in the first and last openings of each header. They should be turned in fourteen to sixteen full threads, so that when backed up into the sections there should be sufficient threads remaining in the drums to make a good joint.

### Setting the Sections.

Place bed plates in position, seeing that they are perfectly level. Commence by setting the back section and plumbing it, then set the front section (which is distinguished by the lugs on the sides) temporarily, and connect the flow and return drums (connect flow drum first) to same, being certain that they are level. Follow next with the intermediate section, connecting to side drums first, and then to top drum, and in the "C" and "D" Series heaters at the proper location set next the bridge wall section (see description of location of bridge wall sections in "C" and "D" Series heaters, page 61). Before placing the bridge wall section in position be sure to bolt to it the plate for the bottom of this section, which forms the back of the ash pit; this plate cannot be put in after the side drums are placed.

At this point insert the plates that close the space between the bridge wall and back section at the top of bridge wall. Then follow with intermediate sections in their regular order, making nipple connections with both flow and return drums. When within one or two sections of the front section, remove it to set the remaining sections, and then connect the front section. Next slide in the grates and adjust the working bar. While setting up the sections use the asbestos cement to thoroughly cement horizontal divisions between the lower and upper set of flues, and also the outside connections where the sections come together.

### Making Up the Lock Nuts.

Make up the lock nuts against the top and side drums with asbestos wicking, soaking in red lead and oil before using. Cut the wicking for "A" Series 24 inches long, and for the "C" and "D" Series 28 inches long.

### The Front.

Next in order is setting the front, making asbestos connection where it goes to the front section, and bolt front to the lugs on front section to receive the same. Bolt on the shaker attachment and connect working rod of grates. Next, attach smoke box in the rear of heater, cementing with asbestos cement.

### The Drip Pipe Connection.

On the side at the bottom of the rear of the top drum will be found a 2 inch tapping, for the purpose of connecting a 2 inch pipe (use nothing smaller) run at right angles to connect with the top tapping on the right hand side of bottom drum. This connection is of vital importance and must be put on to relieve the condensation in the top drum, carrying it back to the bottom of the boiler. Do not attempt to slight the job by leaving off this connection, if you want dry steam and satisfactory results from the start.

### Covering the Heater.

In covering the heater and drums, first give it a thin coat of the cement sent with heater, and after the fire is started apply the balance of the covering, putting it on in two coats; let first coat thoroughly dry; have the last coat as smooth as possible, giving it liberal troweling. See that all the covering is used and not thrown away. The boiler insufficiently covered will radiate heat in cellar, and detract from the capacity of the boiler. Apply the covering 1½ inches thick.

### Trimmings.

Set the trimmings to the heater as shown in illustrations.

### Height of Water Line.

The water line, or center of gauge glass, should be as follows, from the bottom of the heater:

| | |
|---|---|
| No. 1. "B" Series, 42½ inches. | No. 4 to No. 8. "A" Series, 48 inches. |
| No. 3. "B" Series, 45½ inches. | No. 5 to No. 10. "C" Series, 48 inches. |
| No. 5. "B" Series, 50 inches. | No. 7 to No. 11. "D" Series, 55 inches. |

### Steam Damper Regulator.

As shown in illustrations of "A," "C" and "D" Series, the pipe connection from the side of the top drum is simply for a support or stay, to guy the regulator; the pipe connection to bottom of regulator passing through the open tee in the end of the horizontal pipe connection from the side of top drum. Connect regulator to the lift damper and ash door direct, with a chain furnished, and to the rear check damper in smoke box, over two pulleys. Arrange these chains so that the front damper is open and the rear check damper closed. The friction can be reduced to the minimum by the use of two balance levers, screwed into the ceiling,—one end of arm of regulator connected by chain to one end of balance lever, and the other end of balance lever connected by chain to the lift damper in ash pit door. The connection from the check draft in smoke box is

made in same way, with the other end of the regulator and balance lever. This arrangement being very simple, never gets out of order, and is very sensitive to the least pressure on the regulator, and is preferable to the former manner of connecting. Adjust the weight on the damper regulator to suit the pressure at which the apparatus is intended to be operated, usually from 1 to 5 pounds pressure.

### Size of Smoke Pipe

Is stated for each size heater in the tabulations in this catalogue. Use size stated, no other size, and do not reduce it between heater and chimney flue.

### To Distinguish Front and Back End of Drums.

Simply set drums so that the end tappings come in the rear of heater for both bottom and top drums.

## Directions for Setting the Carton Hot Water Heaters.

The foregoing explicit directions for the setting and erection of the Carton steam heaters applies equally well to the Carton hot water heaters with the exception that the trimmings are not used and the drip pipe connection is not put on the hot water heaters.

### Location of Bridge Wall Sections in "C" and "D" Series Steam and Hot Water Heaters.

#### "C" Series.

No. 5 has no bridge wall section.

No. 6 has a bridge wall section.

Nos. 7 and 8 have one intermediate section between back and bridge wall section.

Nos. 9 and 10 have two intermediate sections between back and bridge wall section.

#### "D" Series.

No. 7 has a bridge wall section.

Nos. 8 and 9 have one intermediate section between back and bridge wall section.

Nos. 10 and 11 have two intermediate sections between back and bridge wall section.

# Directions for Using the Carton Steam Heaters.

**First.**

Before starting a fire see that there is sufficient water in the heater, which should be indicated by the gauge glass showing half full of water. Also open lower tri-cock and see that it contains water. The gauge glass should always be half full of water when the heater is in operation, and should the water at any time get below the gauge glass the fire should be drawn and the heater allowed to cool down before water is turned into the apparatus. The water momentarily leaving the gauge glass is not an indication that the water is below the gauge glass in the heater. Make it a rule to see to the water in the gauge glass at the same time the fire is attended to and all trouble will be obviated.

**Second.**

See that the chimney flue, smoke pipe, and flue box in the rear of heater is cleaned and that the draft is good. There must be no opening into the flue other than the smoke pipe of the heater.

**Third.**

In starting fire put in first some shavings or paper, then kindling wood. Light fuel and, after started, add more kindling and when fire is well started put on some coal ("stove" size coal should invariably be used, no larger size) and more as it becomes thoroughly ignited. The fire box should always be full of coal in both mild and cold weather; it should be filled to a level with the bottom of the feed door and then arched up to the center from the sides of the fire box. See that full draft is on the smoke pipe and only a limited draft on the ash pit door; the gas slide in feed door should be closed. In starting fire in the fall, if automatic air valves on radiator are used see that they are properly adjusted. The valves should be opened in starting fire and remain open until all the air is expelled from the system and then set while the radiators are hot. If automatic valves are not used care should be taken in attending to the valves to expel the air, or the radiators will not fill with vapor or steam.

**Fourth.**

The fire is controlled by the automatic damper regulator attached to draft damper in ash pit door and check damper in smoke box in rear of heater. See that the connecting chains are properly adjusted and that they work easily, with little friction. See that they are arranged so that when the damper in the ash pit door is opened the check damper in smoke box is closed. The best results will be secured by the use of two balance levers screwed to the ceiling, which reduces the friction to the minimum and insures the regulator operating instantaneously with the slightest pressure. In moderate weather the regulator can be weighted so that the heater will only generate a stiff vapor, and in cold weather the weights can be arranged so as to generate a pressure from one to five pounds of steam, governed by the temperature outside. In this matter is where a good size heater is appreciated over a smaller size to do the same amount of heating. The safety valve on top will guard against any excess pressure of steam in the heater.

**Fifth.**

A few motions forward and back of the lever handle or handles operating the grates will be all that is necessary to clear the grates thoroughly; it is economy to keep a bright grate surface. Leave the lever handle or shank straight up in a vertical position after operating the grates. Never allow the ashes to accumulate under the grates, to prevent them from warping or burning out.

Remove the ashes thoroughly from the back as well as from the front of the ash pit. Proper attention in this respect will prevent a bill of expense for new grates.

**Sixth.**

Close draft in ash pit and allow full draft on the smoke pipe before opening feed door to replenish with fuel.

**Seventh.**

The flue cleaning door or doors in front of heater should be opened to clean off any deposit that may form on the flues, which can be perfectly cleaned in a few moments with the rice wire brush we furnish, while the boiler is in operation, without causing any dust in the boiler room. A clean boiler is economy, and these flues should be cleaned once a week or more often, depending upon the quality of the fuel, to obtain the best results; the smoke box in the rear of the heater should also be cleaned through the check draft at the same time. Flue doors should be closed tightly and never opened excepting to clean the flues.

**Eighth.**

When the use of the apparatus is discontinued in the spring the water in the heater should not be drawn off but additional water turned into it until the water comes out of the safety valve, and it should be so left during the summer months. Before starting the fire in the fall, drain the heater by drawing all the water off and refilling it again to the proper height, indicated by the gauge glass being half full of water.

## Directions for Using the Carton Hot Water Heaters.

**First.**

Before starting the fire see that the expansion tank contains water; as long as the water can be seen in the gauge glass on the tank it is sufficient. The water gauge glass on the tank should be looked to once a week.

**Second.**

Leave the water in the system during the summer months and draw it all off before starting the heater in the fall and refill the system with fresh water. If the use of the heater is discontinued during the cold weather all the water should be drawn off from the system to prevent freezing.

**Third.**

In filling the apparatus open the air valves on the different radiators or coils to allow the air in the system to escape; leave air valves open until water runs out, then close them up tight. Should any of the radiators or coils not circulate, open the air valve on the radiator affected until the water runs out, then close it tight, and always refill the expansion tank after drawing off water at the air valves.

**Fourth.**

To control the fire use the dampers in the ash pit door and the check draft damper in smoke box in rear of heater provided with a chain or by a key damper in the smoke pipe, if arranged in this way. Open the slide in feed door to supply air for perfect combustion. The feed door should not be opened to regulate the temperature; this can better be accomplished by the use of the dampers, with more satisfactory results and greater economy of fuel. The draft dampers must be regulated, depending on the draft of the chimney; no rule can be laid down in this matter, as no two chimneys draw alike; consequently each apparatus must be regulated as experience teaches and the requirements call for.

# Radiation.

## Steam, Direct.

While the radiating surface that will be required in any room will largely depend upon the proportion of exposed wall and glass surface, there must nevertheless be some relation to the cubical contents of same; and therefore as the simplest and most readily comprehended rule of apportioning radiation we offer the following, derived from the experience of the best heating engineers,—the proposition being a detached building of average construction and exposure, and outside temperature zero.

### One Square Foot of Direct Radiation Will Heat:

| DWELLINGS. | Cubic Feet of Space by Steam. |
|---|---|
| Living Rooms, one side exposed, | 45 to 50 |
| Living Rooms, two sides exposed, | 45 to 50 |
| Living Rooms, three sides exposed, | 40 to 45 |
| Sleeping Rooms, | 50 to 70 |
| Halls and Bath Rooms, | 40 to 50 |
| PUBLIC BUILDINGS. | |
| Offices, | 50 to 75 |
| Schoolrooms, | 60 to 80 |
| Factories and Stores, | 70 to 100 |
| Assembly Halls and Churches, | 100 to 150 |

For Direct-Indirect Radiation add 25 per cent. and for Indirect Radiation add 50 per cent. to the amount of direct surface to secure equal value of heating surface.

Allowances should be made for extraordinary conditions, such as character of buildings, location, exposure, and quality of construction, loose windows and doors, and unusual glass exposure, and the necessary lengths of distributing mains.

### Tapping of Radiators.

| STEAM, TWO PIPE. | Two Tappings. | STEAM, ONE PIPE. | One Tapping. |
|---|---|---|---|
| Up to 20 feet, | ¾ × ¾″ | Up to 20 feet, | 1″ |
| 20 to 40 feet, | 1 × ¾″ | 20 to 40 feet, | 1¼″ |
| 40 to 72 feet, | 1¼ × 1″ | 40 to 80 feet, | 1½″ |
| 72 to 100 feet, | 1½ × 1¼″ | 80 to 100 feet, | 2″ |

## Steam, Indirect.

| Square Feet in Stack, | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|
| Cold Air Duct, First Floor, Sq. In. | 50 | 60 | 70 | 80 | 90 | 100 |
| Cold Air Duct, Upper Floors, Sq. In. | 40 | 45 | 50 | 60 | 70 | 75 |
| Warm Air Duct, First Floor, Sq. In. | 75 | 90 | 105 | 120 | 135 | 150 |
| Warm Air Duct, Upper Floors, Sq. In. | 50 | 60 | 70 | 80 | 90 | 100 |
| Rectangular Registers, First Floor, | 10×12″ | 10×14″ | 12×15″ | 12×15″ | 12×19″ | 12×19″ |
| Rectangular Registers, Upper Floors, | 8×10′ | 8×12″ | 10×12″ | 10×12″ | 10×14″ | 12×15″ |
| Tapping Steam, | 1×¾″ | 1¼×1″ | 1¼×1″ | 1¼×1″ | 1½×1¼″ | 1½×1¼″ |

In appropriating the amount of indirect surface to be used in connection with a low pressure steam system, it ought to be remembered that this manner of heating should be in connection with some system of ventilation, and therefore a larger volume of air must be warmed than when using direct radiation, and proportionately with the system of ventilation. In buildings with a medium provision for ventilation it is good practice to add 50 per cent. to what would be required in direct surface to obtain the amount of indirect required.

Hanging Indirect Stacks.—For cleanliness, as well as for obtaining the best results, indirect stacks should be hung one side of the register or warm air flue opening, receiving the warm air duct from the end of the indirect casing close to the top, and the cold air duct at the bottom of the opposite end. A space of 10 inches (preferably 12) should be allowed for warm air above the stack. The top of the casing should pitch upward toward its exit at least 1 inch or more in its length. A space of at least 6 inches (preferably 8) should be allowed for cold air below the stack and between it and the casing.

# Radiation.

## Hot Water, Direct.

While the radiating surface that will be required in any room will largely depend upon the proportion of exposed wall and glass surface, there must nevertheless be some relation to the cubical contents of same; and therefore as the simplest and most readily comprehended rule of apportioning radiation we offer the following, derived from the experience of the best heating engineers,—the proposition being a detached building of average construction and exposure, and outside temperature zero.

**One Square Foot of Direct Radiation Will Heat:**

| DWELLINGS. | Cubic Feet of Space by Hot Water. |
|---|---|
| Living Rooms, one side exposed, | 25 to 30 |
| Living Rooms, two sides exposed, | 25 to 30 |
| Living Rooms, three sides exposed, | 20 to 25 |
| Sleeping Rooms, | 30 to 40 |
| Halls and Bath Rooms, | 20 to 30 |
| PUBLIC BUILDINGS. | |
| Offices, | 30 to 40 |
| Schoolrooms, | 35 to 50 |
| Factories and Stores, | 40 to 60 |
| Assembly Halls and Churches, | 60 to 100 |

For Direct-Indirect Radiation add 33⅓ per cent. and for Indirect Radiation add 75 per cent. to the amount of direct surface to secure equal value of heating surface.

Allowances should be made for extraordinary conditions, such as character of buildings, location, exposure, and quality of construction, loose windows and doors, and unusual glass exposure, and the necessary lengths of distributing mains.

**Tapping of Radiators.**

| HOT WATER, TWO PIPE. | Two Tappings. |
|---|---|
| Up to 40 feet, | 1 × 1″ |
| 40 to 60 feet, | 1¼ × 1¼″ |
| 60 to 100 feet, | 1½ × 1½″ |
| Above 100 feet, | 2 × 2″ |

## Hot Water, Indirect.

| Square Feet in Stack, | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|
| Cold Air Duct, First Floor, Sq. In. | 50 | 60 | 70 | 80 | 90 | 100 |
| Cold Air Duct, Upper Floors, Sq. In. | 40 | 45 | 50 | 60 | 70 | 75 |
| Warm Air Duct, First Floor, Sq. In. | 75 | 90 | 105 | 120 | 135 | 150 |
| Warm Air Duct, Upper Floors, Sq. In. | 50 | 60 | 70 | 80 | 90 | 100 |
| Rectangular Registers, First Floor, | 10×12″ | 10×14″ | 12×15″ | 12×15″ | 12×19″ | 12×19″ |
| Rectangular Registers, Upper Floors, | 8×10″ | 8×12″ | 10×12″ | 10×12″ | 10×14″ | 12×15″ |
| Tapping Hot Water, | 1¼×1¼″ | 1¼×1¼″ | 1½×1½″ | 1½×1½″ | 1½×1½″ | 2×2″ |

In appropriating the amount of indirect surface to be used in connection with a hot water system, it ought to be remembered that this manner of heating should be in connection with some system of ventilation, and therefore a larger volume of air must be warmed than when using direct radiation, and proportionately with the system of ventilation. In buildings with a medium provision for ventilation it is good practice to add 75 per cent. to what would be required in direct surface to obtain the amount of indirect required.

Hanging Indirect Stacks.—For cleanliness, as well as for obtaining the best results, indirect stacks should be hung one side of the register or warm air flue opening, receiving the warm air duct from the end of the indirect casing close to the top, and the cold air duct at the bottom of the opposite end. A space of 10 inches (preferably 12) should be allowed for warm air above the stack. The top or roof of the casing should pitch upward toward its exit at least 1 inch or more in its length. A space of at least 6 inches (preferably 8) should be allowed for cold air below the stack, and between it and the casing.

In hot water indirect work it is not desirable to supply more than 100 feet of radiation from one connection, and when requirements are for larger stacks they should be divided into two or more connections.

# Chimney Flues.

### Hints to Architects and Builders.

Chimney Flues for Heating Apparatus should be ample in size, and carried as straight as possible from a point near the cellar floor to above the highest projection of the roof. They should be independent, having no connection with other flues or openings, and always of the same area from top to bottom. A well jointed tile flue, preferably round, is better than a square brick flue of larger area. The chimney flue should be carried 3 or 4 feet below the smoke pipe entrance and provided with a clean-out door at the base, tightly fitted, affording easy access for removing the accumulated dust and soot.

**The Size of Flues may be Calculated from the following Table:**

| Total Contents of Building. Cubic Feet of Space. | Average of Direct Radiation. Steam. Square Feet. | Tile Flues, Standard Sizes, Square or Rectangular. Outside Dimensions. | Tile Flues, Standard Sizes, Round. Inside Dimensions. | Brick Flues. Inside Dimensions. |
|---|---|---|---|---|
| 10,000 to 20,000 | 200 to 400 | 8½ × 8½ inches. | 8 inches. | 8 × 8 inches. |
| 25,000 to 50,000 | 450 to 900 | 8½ × 13 inches. | 10 inches. | 8 × 12 inches. |
| 60,000 to 100,000 | 1000 to 1600 | 13 × 13 inches. | 12 inches. | 12 × 12 inches. |
| 100,000 to 150,000 | 1600 to 3000 | 18 × 18 inches. | 16 inches. | 16 × 16 inches. |

Indirect radiation should be counted as 50 per cent. more than direct, and corresponding areas of flue be provided for. The amount of radiation determines the requisite size of boiler, and therefore area of flue.

No chimney flue should be less than 8 inches in depth.

Ventilating Flues should be provided for in original plans. They should be located in inside walls, and in proximity to chimney flues when possible, deriving therefrom the necessary heat to secure an upward movement of the currents. The opening in these flues should be at the bottom. Every room that is to be warmed by indirect radiation must have a vent flue to insure a proper circulation of warm air.

The areas of vent flues should be about 1 square inch to every 20 cubic feet of space.

# Important! The Coal Question.

The question of the quality and the size of the coal is of vital importance, and a great deal of annoyance would be overcome if this question received the attention it should by the users of steam and hot water heaters. The coal dealer will invariably fill an order for coal for a boiler with "egg" size, or, what is still worse, what is termed "furnace coal"; whereas the proper size for all boilers is what is known as "stove" size. The larger sizes are only fit for blast furnaces where a strong pressure blast is required to burn it. Do not use these larger sizes under any conditions; they are not adapted to house heating purposes. In the majority of cases where people complain of the amount of coal consumed, the cause is usually the size and quality of the coal. Under ordinary firing with these larger sizes of coal, the fire will die out around the sides, and what is ignited will only be partially consumed, causing a waste of fuel; the fire cannot be controlled, and it will need constant attention. Fitters giving their customers the above advice will enable them to get the best results in heating.

## For Heating Greenhouses and Conservatories.

The following data will be safe practice for houses of average construction without exceptional conditions or circumstances.

| | | |
|---|---|---|
| Outside Temperature,.. | Zero. | Zero. |
| Temperature Required, | 40° to 50° Fah. | 50° to 70° Fah. |
| Direct Steam, 1 square foot,..... | 5 to 6 square feet of Glass. | 4 to 5½ square feet of Glass. |
| Direct Hot Water, 1 square foot,..... (Open Tank.) | 3½ to 4 square feet of Glass. | 2½ to 3½ square feet of Glass. |

### Size of Steam Mains to be Used on a Two Pipe Steam Job for Direct Radiation.

Mains giving the best results leave the boiler of ample size, and are reduced very slowly if at all. The returns should be only one or two sizes smaller than the flow.

| Square Feet of Radiation. | Size of Mains. | Square Feet of Radiation. | Size of Mains. |
|---|---|---|---|
| 50..... | ¾ inch. | 300 to 400..... | 2 inch. |
| 100..... | 1 inch. | 400 to 600..... | 2½ inch. |
| 150..... | 1¼ inch. | 600 to 800..... | 3 inch. |
| 200 to 300..... | 1½ inch. | 800 to 1000..... | 3½ inch. |

If one pipe system is used, use mains one size larger than above. Pitch mains 1 inch in every 10 feet. In one and two pipe work pitch mains from boiler and returns to boiler. Main flow and return pipes from which branches should be taken are preferable to running separate flow and return pipes.

### Size of Mains to be Used on a Hot Water Job for Direct Radiation.

| Square Feet of Radiation. | Size of Mains. | Square Feet of Radiation. | Size of Mains. |
|---|---|---|---|
| 50..... | 1 inch. | 500 to 1050..... | 3½ inch. |
| 50 to 100..... | 1¼ inch. | 1050 to 1400..... | 4 inch. |
| 100 to 200..... | 1½ inch. | 1400 to 1800..... | 4½ inch. |
| 200 to 350..... | 2 inch. | 1800 to 2200..... | 5 inch. |
| 350 to 500..... | 2½ inch. | 2200 to 3000..... | 6 inch. |

Flow pipes should have an upward pitch toward the radiator and the return pipe toward the boiler, about 1 inch in 10 feet.

The sizes of flow and return pipes for hot water circulation should be the same, and sizes for mains should be ample to supply the different branches to the radiators.

All piping should be laid out with reference to the free passage of the water in the system, which will be aided by the use of Y's and 45 degree elbows. Do not use pipe smaller than 1 inch.

## Pressure on Hot Water Boiler.

To find the pressure on a hot water boiler, multiply height of water line by .434; the result will be pounds in square inches.

## Mechanical Ventilation.

1 square foot flue surface for every 8,000 to 10,000 cubic feet of air discharged is good practice; larger flues for less velocity.

1 square foot of glass will lose as much heat as 6 square feet of 12 inch brick wall. If closely fitted double sashes are used, 75 per cent. less heat will be lost than with the single sash.

## Heating Surface in Wrought Iron Pipe.

| | |
|---|---|
| 36 inches 1" pipe contains 1 square foot. | 20 inches 2" pipe contains 1 square foot. |
| 28 inches 1¼" pipe contains 1 square foot. | 15 inches 3" pipe contains 1 square foot. |
| 24 inches 1½" pipe contains 1 square foot. | 10 inches 4" pipe contains 1 square foot. |


The T Co.